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ABSTRACT

Divided into three major sections, this report documents the introduction and first year of the educational computing program, introduced at the University of Maine at Presque Isle in 1985 and discontinued in 1986. The first section provides details on the program: its goals, the baccalaureate degree, and a proposed university certificate for teachers; the educational computing curricula; educational computing and the Division of Education, Health, Physical Education and Recreation (E/HPER); educational computing and the community; educational computing and the State of Maine; and educational computing facilities and resources. The second section contains commentary by the program coordinator on each of these topics. The appendices contain supporting documents: (1) the statement of mission; (2) a listing of the four-year curriculum for educational computing majors; (3) competencies and courses for the educational computing certificate for teachers; (4) course offerings; (5) course descriptions; (6) outline and revision of the initial introductory course; (7) electronic text display research proposal; (8) a brochure on the program; (9) various documents related to a non-credit offering on computer-assisted farming; (10) a 48-item bibliography; (11) a synopsis of an Association for Computing Machinery (ACM) report detailing a proposed curriculum for a program of study leading to computer science teacher certification at the precollege level; (12) materials and equipment needed for the program; and (13) miscellaneous memos and news releases. (MES)

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University of Maine Presque Isle

Educational Computing

Annual Report 1984-1985

Prepared by
Dr. A. R. J. Yeaman
July, 1985

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University of Maine
Presque Isle

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Introduction

Beginning in 1983 the Education and Computer Science faculty saw a need for furthering the University's course offerings on computing. To determine the direction, literature searches, a statewide survey and experts were consulted. The result was the creation of a Bachelor of Science degree in Educational Computing. In October of 1984 a Coordinator of Educational Computing, Dr. A. R. J. Yeaman, was hired and implementation of the program began. The first course in the program was taught Spring Semester, 1985.

This report focuses on activities following the hiring of the Coordinator. Information on previous University activities can be found in the Intent to Plan and the Educational Computing Program Proposal.

The report is divided into three major sections. The first provides informational details on the Educational Computing Program: the goals, the baccaluareate degree and a proposed University Certificate for Teachers; the Educational Computing Curricula; Educational Computing and the Division of E/HPER; Educational Computing and the Community; Educational Computing and the State of Maine; and Educational Computing Facilities and Resources. The second section contains commentary by the Coordinator regarding these subjects. Finally, supporting documents are provided as appendices for reference and to ensure complete coverage.

Educational Computing Program

Goals

1. Produce new, certified teachers capable of being computer science educators at the secondary school level.

2. Produce new, certified teachers dedicated to acting as building-level resource personnel in computing; they will manage computer centers and help other teachers instruct with computers.

3. Assist teachers incorporate Educational Computing into their instructional repertoire.

4. Assist teachers in making good decisions about planning, evaluating and revising Educational Computing facilities, equipment and software.

5. Develop an Educational Computing track for students interested in working in business.

(Appendix A contains a complete discussion of the goals as part of the program's "Philosophy and Rationale" statement.)

Educational Computing Bachelor of Science degree

1. Curriculum requirements for completing the Bachelor of Science in Educational Computing were constructed in1984 and revised in February, 1985. (See Appendix B for these requirements.)

2. A small number of students have expressed interest in declaring Educational Computing as their major. These numbers are expected to increase in the future.

3. At this time the curriculum has not been presented to the State Department of Education and Cultural Services for teacher certification consideration at the secondary level. Presentation is anticipated for the 1985-86 academic year.

Educational Computing Certificate for Teachers

1. Competencies and requirements for a University Educational Computing Certificate for currently practicing teachers were developed in December, 1984. (See Appendix C for these competencies and requirements.)

2. This will serve the immediate needs of Maine teachers for inservice education and there is strong interest.

3. A proposal for a University Educational Computing Certificate will be presented to the Division of E/HPER. Hopefully it will become effective during the 1985-86 academic year.

Educational Computing Curricula

Course Descriptions

1. Course descriptions were developed for four courses in the Educational Computing major. (See Appendix D for a complete list of courses in the major and Appendix E for the course descriptions.)

2. A course outline was developed for Introduction to Educational Computing and subsequently revised. (See Appendix F for the outline and its revision.)

Courses Offered in 1984-85

1. Courses offered in 1984-85 were listed with COS prefixes: Computer Science classes. In the future they will be Education classes with EDU prefixes.

2. Introduction to Educational Computing was the only course offered for majors in 1984-85.

3. Two sections of Computer Literacy (COS 101) were taught by the Educational Computing Coordinator. Education students were at that time advised to take this course as a prerequisite to the Educational Computing sequence.

Workshops and Professional Presentations

1. March 30, 1985 a workshop for teachers new to computing and thinking about buying a personal computer was presented through the Professional Development Center. Participants were enthusiastic.

2. A two hour hands on introduction and overview to Educational Computing was presented to students enrolled in the Summer Session Introduction to Educational Computing course. Five students were not sufficient, however, for the course to continue to completion.

3. April 27, 1985, as part of the Aroostook Right to Read Conference, a session on the psychological aspects of microcomputer use was presented and illustrated with slides.

4. Development of a framework for electronic book research was the focus of a scholarly paper given at the National Conference held by the Association for Educational Communications and Technology, January 18-22, 1985.

Educational Computing and the Division of E/HPER

1. It was recommended in the spring that E/HPER students take Introduction to Educational Computing instead of Computer Literacy. Discipline specific computer courses are more advantageous to students in their professional preparation. (See Appendix G.)

2. The Coordinator of Educational Computing was awarded 25% release time by the Division for the Fall of 1985 to complete a research project on window effects in reading from an electronic book. (See Appendix H for the proposal and also see Appendix I.)

Educational Computing and the Community

Public Relations

1. Numerous articles appeared in the local newspapers and *The Bangor Daily News*. The news releases were prepared by the Director of University Relations in cooperation with the Coordinator of Educational Computing. (See Appendix J for sample articles.)

2. Coverage of the Educational Computing program was also provided by the *University Times* and the *UMPI Image*.

3. An in-house temporary brochure on the Bachelor of Science degree in Educational Computing was prepared for distribution in May, 1985. (See Appendix K for the brochure.)

Public Awareness

1. The Educational Computing Coordinator represented the University at the Aroostook Computer Fair held at Caribou High School and sponsored by the Aroostook Computer Educators. The Macintosh microcomputer was demonstrated and prospective students were contacted.

2. The Educational Computing Coordinator attended a board meeting of the Aroostook Computer Educators and told them about the University's new program in Educational Computing. In addition, an informative article on the program was submitted and subsequently published in their newsletter.

Speaking engagements

1. Two lectures and question and answer periods for high school honors students were conducted in November, 1984 for the University Honors Day Program.

2. A lecture on computer assisted farming was presented as part of a special two-day workshop for local agribusiness people. In addition, demonstrations of the Macintosh microcomputer were provided to workshop participants. (See Appendix L.)

Educational Computing and the State of Maine

Public relations

1. A description of the Educational Computing degree was published in the national publication *Technological Horizons in Education,* April, 1985. (See Appendix M for a copy of this article.) This lead to questions from people outside the state and assistance was provided.

2. Nearly 100 Educational Computing brochures were distributed to Maine librarians and media specialists at the MEMA/MLA conference. (See speaking engagements below for details.)

Public awareness

1. The Coordinator was appointed as a member of the State Technology Task Force and presented information relating to the Educational Computing Program at two separate meetings held in the State Library in Augusta.

2. Individual conversations detailing the Educational Computing program were held with the following educational leaders: Marilyn Clark, Turner Memorial Library; Dennis Kunce and Richard Riley, State Department of Education; Doris Ray, Maine Computer Consortium; Elaine Albright, Fogler Library UMO; Andy Abbott, Media Services UMO; and others.

Speaking engagements

1. The Educational Computing coordinator attended Maine Computes '85 and presented a session detailing the Bachelor of Science program in Educational Computing. This was held on April 10, 1985 at the Augusta Civic Center.

2. At the annual conference of the Maine Educational Media Association and the Maine Library Association , May 19-21, 1985, a lecture focusing on computer interfaces was presented.

Educational Computing Facilities and Resources

Facilities used during 1984-85

1. Academic Computing Center, Folsom 102A.
2. Computer classroom, Folsom 101A.
3. Coordinator's temporary office and laboratory, Folsom 101B.

(See Appendix N.)

Resources

1. Use of the Academic Computing Software Collection.
2. Library holdings: books and periodicals. (See Appendix O.)
3. One Macintosh microcomputer and peripherals.

Educational Computing Program

Commentary

Goals

Computers are becoming more accessible and are diffusing into all aspects of education. Consequently, the increasing use of computers by teachers and students in all subject areas is accompanied by more frequent announcements of new positions for School Coordinators of Educational Computing at the building and district levels. There is a need for people with the proper education to asume these positions.

Earlier this year a report by the Association for Computing Machinery, the national computer science organization, stated that most public school computer educators have an eighth grade knowledge of computing at best. (See Appendix P.) A distinction divides computer education from Educational Computing. The first means teaching about computers whereas the second describes the use of computers in instructional processes. These are two separate areas of specialization. Computer education is directly related to computer science while Educational Computing is a branch of educational technology. The computerization of schooling requires specialists in Educational Computing.

They may be new graduates or current teachers who have acquired additional coursework. There is a need for new teachers who do have adequate preparation to be computer educators. Current teachers need to make up their deficiency through gaining appropriate coursework, although they often lack opportunities.

The first two goals of the program are long range and will take longer to develop fully. This means there will be more time for fine tuning and adjustment to meet the needs of students and the schools. Work is under way on the second two goals through offering courses, workshops and consulting activities. The fifth goal depends on the need for people to develop computerized training for business. This seems a promising area but so far progress has been exploratory. More details on the state of the goals of the Educational Computing Program are provided in the remainder of this commentary.

Educational Computing Bachelor of Science degree

Despite the initial predictions, only a small number of students have declared themselves to be Educational Computing majors. Although this is disconcerting, analysis of the situation provides some insight. Any entering students must want to be in Education and then complete requirements for Maine Teacher Certification. There is a conflict because students cannot yet be certified in Educational Computing as a subject area. They must take courses in another area in order to qualify for teacher certification from the State. Students who would desire to be Educational Computing majors may, quite reasonably, declare their major in those other areas.

A further problem is that a syllabus leading to certification may take quite some time to be approved by the Department of Educational and Cultural Services. The need for a teaching certificate in Educational Computing and what its bounds and emphases are still needs to be established at the State level. Overt moves towards obtaining approval from the Department of Education will be made in the coming academic year. It is fair to point out that some reticence to make a commitment has been detected as these are thought to be early days.

A major question to be addressed in the coming year is what other steps can we take to make the Educational Computing Bachelor of Science degree seem less of a gamble to prospective students?

Educational Computing Certificate for Teachers

Many teachers want some coursework about microcomputers as related to goals three and four but not the Bachelor of Science degree. A University certificate could fill the need for recertification credits and give teachers a focus for their coursework, rather like a minor. Developing a coherent inservice program leading to a University certificate would give school districts an assurance of competency when assessing candidates for positions containing Educational Computing as a component. At present, judgement of applicants' resumes depends on the comparison of fragmentary lists of classes, workshops and self teaching that provide no guarantee of quality, capability or in depth knowledge. The granting of University certificates in this field would be a considerable improvement and indicate that the holders have a solid foundation in Educational Computing.

The University certificate is also a way of bridging the enrollment gap until the Bachelor of Science degree is more securely in place.

Educational Computing Curricula

Commentary

Course descriptions

A good start was made in developing the courses for this program. In addition, much work was done on surveying and selecting appropriate texts and also on assigning areas of knowledge to various courses: developing the scope and sequence of the curriculum. Thus the curriculum builds a sequence of skills and reflects knowledge of relevant content.

Courses Offered

The only course offered during the 1984-85 academic year was well received. Requests for Summer Term courses were unable to be met because of enrollment quotas. As more people learn about the program enrollments should continue to increase. At the present time, however, it is important to make the times and dates amenable to practicing teachers e.g. night courses and summer courses offered after the public schools are closed.

Workshops and Professional Presentations

The short courses and workshops on educational computing issues were well received. Interest was expressed by people from all subject areas in applying microcomputers to solving instructional problems.

Educational Computing and E/HPER

Commentary

Two changes in the Educational Computing program increased its usefulness to students in E/HPER. The first was the creation of a three course sequence--introduction, intermediate and Advanced--with Introduction to Educational Computing being a substitute for Computer Literacy. This makes the introductory course reflect more of the problems and challenges appropriate for E/HPER students. The second change, replacing COS course numbers with EDU course numbers reflects the emphasis on educational issues.

The award of 25% release time to the Coordinator for research on reading electronic text was a very worthwhile investment. There is much which needs to be learned relevant to the field of Educational Computing: at least two thousand microcomputers are installed specifically for educational purposes every week. It is unfortunate that the release time will not be made available. However, the process of applying for and receiving the award from colleagues made the concerns of Educational Computing more visible, understood and appreciated.

Educational Computing and the Community

Commentary

Developing a positive image and exposing the community to the area of Educational Computing was an important step forward. As this is a very new field, parents and future students--and other community members--may be reluctant to see it chosen as a major unless it is understood more clearly. All activities were designed to increase community knowledge about Educational Computing and show its benefits.

Educational Computing and the State of Maine

Commentary

As the only Educational Computing degree in the state, the Bachelor of Science offered at Presque Isle is significant to the rest of the state. The existence of the program and the benefits to students from other parts of the state must be made known. There is some reluctance from people in the southernmost portions of the state to travel north for coursework. More exposure of the program and attempts to modify attitudes will be necessary to increase the potential of the program to draw students from other areas of the state.

Facilities and Resources

Commentary

Facilities

This year three sites in Folsom were utilized. The Academic Computing Center served as a lab for individual student work and was sometimes reserved for hands on class demonstrations. The computing classroom with the large monitor was not always available due to a class scheduling conflict but informal room exchanges avoided any real problems. Folsom 101B provided a faculty office for the Coordinator and also a lab space for small groups, seminars, workshops and classes working with the Macintosh microcomputer. There will be even more need for this secure lab facility for Educational Computing in the future, particularly with computer interactive video and online searching capabilities.

Resources

Resources are somewhat sparse and Educational Computing students had to make do with what was available. Educational software needed to augment the academic computing software collection was selected with the view in mind of supporting the Educational Computing program's goals. Funds were not available to initiate purchases.

About $500.00 was available in the library for the purchase of books supporting the Educational Computing program. The Coordinator selected books, compiled four bibliographies and built a core collection of reserve books. (See Appendix O.) The periodical holdings should probably be increased by the addition of at least one scholarly, research oriented journal in the field of Educational Computing. Several journals are currently undergoing scrutiny and the one with the best evaluation will be suggested for subscription.

Funds from Academic Computing and E/HPER allowed the purchase of one piece of hardware that is state of the art. This is the Macintosh microcomputer and the word processing and graphics production software bundled with it. (See Appendix Q for a graphic produced with MacPaint.) While only here for a few months it has been of great value in demonstrating the positive, forward looking view shown by the University's commitment to the Educational Computing program.

The allocation of bond issue money for Academic Computing is at this time still not fully decided upon. There is a possibility of improving the Educational Computing program with a Computer Based Interactive Video facility through some of these funds. (See Appendix R for the proposal.)

Program Development

Strategies towards a plan for dealing with the future needs to be the foremost concern in light of the potential student enrollment and the University's geographic location. Keeping up with new technology is a considerable challenge but should not be the only object of planning. The University's economic and student demographic realities are essential variables moderating the attainment of excellence. However, development provides justification for technological support as related to program goals. (See Appendix S.)

Conclusion

The focus this year has been on constructing goals, philosophy, rationale and course descriptions. Further developments on this framework can be made in succeeding years. There is a need for the creation of a plan addressing the establishment of adequate software, hardware and online services; laboratory facilities and their remodeling; faculty assigned 100% to Educational Computing and expansion of the Educational Computing faculty; and program evaluation. Similarly there is a need to look at the cooperative relationship between Academic Computing and Educational Computing due to their parallel needs and goals. These are the program management steps to be taken next. The focus for next year will be on developing public awareness and student enrollment in the program.

Appendix A

THE EDUCATIONAL COMPUTING PROGRAM: PHILOSOPHY AND RATIONALE

Dr. Andrew R. J. Yeaman
Assistant Professor & Coordinator of Educational Computing
University of Maine at Presque Isle

Statement of Mission

The purpose of the Educational Computing program is to assist in the improvement of schooling. It will do this by spreading computing knowledge and by fostering the application of computing technology in educational settings. The program will focus on the context of pre-college instruction and is located in the Education/Health, Physical Education and Recreation Division. It is expected that the students who become Educational Computing practioners will be enrolled as education students.

Educational Computing has not always existed in its present and emerging form. It originates from the mutual interests of educational technology and computer science in enhancing communication. The two fields were brought together by changes in educational philosophy which advocated new teaching methods, such as individualized instruction, programmed learning and systematic instructional design. The recent drop in the cost of computing has made the implementation of Educational Computing possible.

Nevertheless, if there is no concurrent investment in teacher preparation, the advantages of computerized schooling in a computerized society will remain unattained. This poses two problems which reflect the two fields Educational Computing is founded upon. The degree program leading to the Bachelor of Science in Educational Computing was specifically designed to help alleviate these problems.

The First Problem

Not only is computer literacy demanded of all high school graduates but some require a sophisticated knowledge of computer science in order to continue their education without disadvantage. Unfortunately, few secondary school teachers have this capability themselves and in-service opportunities for acquiring the in-depth knowledge needed are severely limited.

The First Goal

The first major goal of the program is to produce new, certified teachers capable of being computer science educators at the secondary school level.

The Second Problem

The diffusion of computing technology is governed by the same forces surrounding any innovation: it probably works best when it allows intensification. When people can be noticeably more productive than they were before, the change should be successful and widely adopted. With a history of fads and technological fixes in education resulting in no important gains in achievement, efforts to computerize schooling could be futile. The usual obstacle has been lack of training rather than equipment shortages. Since computing still requires specialist knowledge, it seems unlikely that the information delivery system in education will benefit. The crucial factor is the availability of human resources to transmit the necessary knowledge to staff and students.

The Second Goal

The second major goal of the program is to produce new certified teachers dedicated to acting as building-level resource personnel in computing; they will manage computing centers and help other teachers instruct with computers.

The curriculum for the Bachelor of Science in Educational Computing has been created to fulfill the two needs described here. The graduates holding that degree will teach secondary computer science, manage a computer center, work with other teachers and be able to assist in planning for computer needs at the building level. This degree is described in more detail in the appropriate brochure.

Future Developments

The need for teachers skilled in Educational Computing does not stop here. Not only does the original survey call for more people than the Bachelor of Science plan will graduate, but the needs for the program's second goal go beyond. While a strong preparation in Math and Science is vital to developing

good computer science educators, this has little to do with using computers as effective educational tools, the program's second goal. In particular, being computer literate and knowing how to use computers is not the same thing as knowing how to program. Since computing is for everyone, in light of the purpose of the Educational Computing program, alternative ways of putting knowledge into practice must be found.

Allowing pre-service and in-service teachers to take a single, catch-all course as they can fit it into their schedules is not enough when a systematic approach could produce more educational computing specialists. A certificate in Educational Computing from successfully completing prescribed series of courses and electives would accomplish two subgoals. The certificate sequence would also be an optional minor for education undergraduates aside from the preparation of computer science educators.

The First Subgoal

The first subgoal of the program is to assist teachers incorporate Educational Computing into their own instructional repertoire.

The Second Subgoal

The second subgoal of the program is to assist teachers in making good decisions about planning, evaluating and revising Educational Computing facilities, equipment and software.

POLICY

The Bachelor of Science in Educational Computing degree is supported by a four year program of structured education seeking to prepare most of its students for the future; some as far ahead as five years. Students will need to have the intellectual skills and attitudes to enable them to continue learning as their chosen field develops beyond their graduation date. As practicioners, teachers in the Certificate program will have the same needs but sooner.

Since the future of Educational Computing cannot be predicted with much accuracy, the whole program should look forward and seek out the new and innovative. Educational Computing should respond with sensitivity to:

1. New ways of using computers for people to communicate.
2. New interface and storage devices.
3. New learning software.

PROCEDURES

This section addresses the concrete aspects of the three objects of the policy as faculty development and hardware and software acquisition.

Faculty

Maintains current knowledge of Educational Computing activities and new developments in the field relevant to schools and to businesses.

Engages in scholarly activity by creating and disseminating new knowledge relevant to the field.

Participates in professional organizations in the field.

Hardware acquisition criteria

Hardware representative of that found in school and in business for instruction.

New instructional hardware with positive reviews.

Innovative hardware for business, home or school which supports the amplification of intellect.

Software acquisition criteria

Software representative of that found in school and in business for instruction.

New instructional software with positive reviews.

Innovative software for business, home or school which supports the amplification of intellect.

Software helping educators and/or students be more productive.

Instructional packages for learning about specific computing hardware and/or software: manuals, disks, sound and videorecordings etc.

Software definition:

Software is usually present in a physical storage medium such as a disk or a chip. However, it may also be delivered or accessed electronically. That software could be unique, of time value or a contribution to distance learning. Therefore, communication software and subscriptions to online services for electronic delivery should not be neglected.

Appendix B

University of Maine-- *Presque Isle*
Division of Education, Health, Physical Education and Recreation

EDUCATIONAL COMPUTING MAJOR
(128 Credit Hours)
Four-Year Curriculum

Freshmen

FALL		
EDU 160	Introduction to Educational Computing	3
ENG 101	Composition and Literature I	3
MAT 131	Calculus I	4
EDU 150	Exploring Contemporary Education	4
	Social Science Elective	3
		17
SPRING		
EDU 161	Educational Computing--Intermediate	3
COS 125	Introduction to Business Computing	3
MAT 274	Elementary Linear Algebra	3
ENG 102	Composition and Literature II	3
PSY 100	General Psychology	3
		15

Sophomore

FALL		
COS 220	Advanced Programming I	3
EDU 200	Learner and Learning Process	4
SPE 106	Public Speaking	3
	Minor (2)	6
		16
SPRING		
EDU 250	Educational Programming	3
COS 250	Information Process	3
PHY 245	LL Intermediate Physics	4
EDU 386	Mainstreaming	3
	Minor	3
		16

University of Maine-- *Presque Isle*
Division of Education, Health, Physical Education and Recreation

EDUCATIONAL COMPUTING MAJOR

Junior

FALL		
COS 320	LL Computing Elective I	4
EDU 310	Teaching Process	3
COS/MAT 330	Algorithms	3
	Humanities Elective	3
	Minor	3
		16
SPRING		
EDU 275	Management of Educational Computing Environments	4
EDU 353	Reading, Content Area	3
	Fine Arts Elective	3
	Minor (2)	6
		16

Senior

FALL		
EDU	Educational Computing--Advanced	3
EDU	Methods in Computing	3
HEA 124	Principles of Health	3
	Social Science Elective	3
	Free Elective	2
	Minor	3
		17
SPRING		
EDU 495	Student Training	15

UNIVERSITY OF MAINE AT PRESQUE ISLE
Division of Education, Health, Physical Education and Recreation

EDUCATIONAL COMPUTING MAJOR
(128 Credit Hours)
Four-Year Curriculum

FRESHMAN

Fall			Spring		
Cos 120,	Intro Ed Computing I	3	Cos 121,	Intro Ed Computing II	3
Eng 101,	Comp & Literature I	3	Cos 125,	Intro Business Computing	3
Mat 131,	Calculas I	4	Mat 274,	Elementary Linear Algebra	3
Edu 150,	Exploring Contemporary Ed	4	Eng 102,	Comp & Literature II	3
	Social Science Elective	3	Psy 100,	General Psychology	3
		17			15

SOPHOMORE

Cos 220,	Advanced Programming I	3	Cos 221,	Advanced Programming II	3
Edu 200,	Learner & Learning Process	4	Cos 250,	Information Process	3
Spe 106,	Public Speaking	3	Phy 245,	LL Intermediate Physics	4
	Minor (2)	6	Edu 386,	Mainstreaming	3
				Minor	3
		16			16

JUNIOR

Cos 320,	LL Computing Elective I	4	Cos 321,	Computing Elective II	4
Edu 310,	Teaching Process	3	Edu 353,	Reading, Content Area	3
Cos/Mat 330,	Algorithms	3		Fine Arts Elective	3
	Humanities Elective	3		Minor (2)	6
	Minor	3			
		16			16

SENIOR

Edu	Methods in Computing	3	Edu 495,	Student Training	15
Cos 400,	Mgt Computing Facility	3			
Hea 124,	Principles of Health	.3			15
	Social Science Elective	3			
	Free Elective	2			
	Minor	3			
		17			

Appendix C

Competencies for Holders of the Certificate in Educational Computing:

1. Advise teachers, schools, school districts and small businesses on obtaining and using needed hardware, software and on-line services.

2. Create policy and procedures for selecting and evaluating courseware relevant to the context.

3. Advise on computer interactive video.

4. Advise on systematic instructional design of courseware.

5. Establish microcomputer learning environments which are both efficient and high in humane qualities.

6. Manage the operation of an educational computing center including budget preparation and the supervision and training of assistants.

7. Analyze information processing needs, write position papers and establish strategies for attaining the goals.

8. Evaluate Educational Computing programs by using formative and summative techniques.

9. Apply the intellectual foundations of Educational Computing by demonstrating critical analysis of new developments.

10. Engage in the lifelong learning essential to keeping up with:
    1. new developments in computing technology; and,
    2. activity on the research frontier of education.

UNIVERSITY OF MAINE AT PRESQUE ISLE

EDUCATIONAL COMPUTING CERTIFICATE COURSE

18 Credits Total Required: 12 Credits of Required Courses: Plus, 6 Credits in Electives of 3 Credits Each

Required:

Computer Literacy or Microcomputer Literacy for Teachers	3 Credits
Introduction to Educational Computing I	3 "
Introduction to Educational Computing II	3 "
Educational Computing Software Selection & Evaluation	3 "
	12 "

Electives: 3 Credits Each (Student Choice)

Any Programming Classes Offered for Which the Student Meets the Prerequisites
Any Hardware Classes with the Same Constraint
Managing Educational Computing Centers
Systematic Design of Computer
Assisted Instruction and Computer Interactive Video
Personal Computers for Teachers
Crucial Issues in Educational Computing
Data Management for Educational Administration

Concluding Remarks:

Future plans, tentative at this time, include an Elementary Education Curriculum in Educational Computing. All students will be encouraged to build their own particular areas of accomplishment within any program and specialties in computer interactive video and the accessing of on-line national databases are upcoming possibilities. Computers are for everyone and teaching programming is not the same thing as teaching how to use computers.

Appendix D

TO Sharon Roix
Registrar

FROM Dr. Jack C. Sheltmire
Chairperson, Division of E/HPER

DATE February 19, 1985

RE Schedule Additions (1985-1986)

Please add the following courses to the 1985-1986 Academic Schedule:

Fall 1985:

Edu 160, Introduction to Educational Computing, 305-4:20 p.m.,
T,Th, Dr. Andrew Yeaman

Edu 161, Intermediate Educational Computing, 6:00-9:00 p.m.,
M, Dr, Andrew Yeaman

Spring 1986:

Edu 161, Intermediate Educational Computing, 3:05-4:20,
T,Th, Dr. Andrew Yeaman
Edu 250, Educational Programming, 6:00-9:00 p.m.
Th, Dr. Andrew Yeaman
Edu 275, Management of an Educational Computer Facility, 6:00-9:00 p.m.
M, Dr. Andrew Yeaman

JCS:mah

dd: Dr. Andrew R. J. Yeaman

Appendix E

UNIVERSITY OF MAINE *Presque Isle*

EDUCATIONAL COMPUTING 1985-86

Dr. A. R. J. Yeaman

EDU 160 Introduction to Educational Computing

A survey course with a computer literacy foundation in which students will develop practical and analytic skills related to Educational Computing. Topics: history, components, operation, control/programming, cultural/economic impact and moral/ethical issues. Building on this foundation, the application of microcomputers to education and training will be introduced.

EDU 161 Educational Computing: Intermediate

A close-up view of social and psychological issues surrounding the role of computing in instructional processes. Emphasizes the selection of software, hardware and online services relative to needs assessment.
Prerequisite: EDU 160.

EDU 250 Educational Programming

Systematic instructional design principles will be applied to courseware authoring projects for education or training. The course will emphasize the development of materials for Computer Assisted Instruction and Computer Based Interactive Video.
Prerequisite: EDU 160, EDU 161.

EDU 275 The Management of Educational Computer Environments

Ranging from philosophical justifications to technical procedures, this course will concentrate on the evaluation, planning and implementation of facilities supporting Educational Computing.
Prerequisite: EDU 160, EDU 161.

Appendix F

UNIVERSITY OF MAINE *PRESQUE ISLE*

Summer, 1985

Course Outline

EDU 160 Introduction to Educational Computing

Description:

A survey course with a computer literacy foundation in which students will develop practical and analytic skills related to Educational Computing. Topics: history, components, operation, control/programming, cultural/economic impact and moral/ethical issues. Building on this foundation, the application of microcomputers to education and training will be introduced.

Instructor: Dr. Andrew R. J. Yeaman

Office Hours:

Office: Folsom 101B

Telephone: 764-0311 Ext 300
Ext 301 for messages

Text and Materials:

Taffee, S. J. (Ed.) (1985)
Computers in education 85/86, Guilford, CN: Dushkin.

At least one 5 1/4 inch floppy disk.

Additional Resources:

Selected articles from authoritative periodicals.

Library reserve booklist, periodicals and other library resources.

Hardware and software documention.

Objectives:

By the end of this course students will be able to:

* Outline the history of computing.
* Discuss the social impact of computing.
* Operate an Apple II microcomputer properly.
* Perform the rudiments of electronic text editing and formatting with the Appleworks word processor.
* Apply basic knowledge of the psychology of the student-computer interface.
* Demonstrate some familiarity with commercially produced educational computing software.
* Demonstrate instructional uses of BASIC and LOGO.
* Express informed opinions on the past, present and future conditions of educational computing.
* Formulate rational points of view regarding educational computing's dual relationship with computer science and educational technology.

Evaluation of Student Learning:

Mastery level proficiency in the objectives is essential to pass this class and will be determined through the completion of non-graded assignments. Letter grades will be based on two midterm examinations (15% each) and a final examination (20%). The term project weighs 40% and will be evaluated in two ways:
A presentation in class of the term project will carry 15% and a term paper on the same topic will be worth 25%. Term papers word processed by the student writer receive 5% extra credit. Quality of participation in class will contribute 10% of the final grade.

Regular class attendance and participation is expected.

UNIVERSITY OF MAINE AT PRESQUE ISLE

Spring 1985

Course Outline:

Cos 196, Introduction To Educational Computing

Description:

This course will survey applications of computing in educational settings. Students will develop their practical and analytic skills within this context.

Computer Literacy, or its equivalent, is a prerequisite, simultaneous enrollment is acceptable.

Instructor Dr. Andrew R. J. Yeaman
Office Hours: Monday: 9:30 p.m. - 10:30 p.m. Tuesday: 12:05 - 1:05 p.m.
Office: Folsom 101B Thursday: 8:00 p.m. - 9:00 p.m.
Telephone: 764-0311, Ext.
Ext. 301 (to leave a message)

Texts and Materials:

Association for Educational Data Systems Journal, Vol 17, Nos. 1 & 2, Fall & Winter, 1983.
(Special issue on Applications of Microcomputers for Instruction and Educational Management). 1201 Sixteenth St., NW, Washington, D.C. 20036 ($10.00)

Teachers College Record, Vol. 85, No. 4, Summer 1984.
(Special issue on The Computer in Education in Critical Perpective).
Box 103, Teachers College, Columbia University, NY 10027 ($6.00)

Several floppy disks: Verbatim Datalife.

Fox, Annie & Fox, David (1983). Armchair Basic: An Absolute Beginner's Guide to Programming in BASIC. Berkeley, CA: Osborne/McGraw-Hill

Additional Resources:

Library booklist, periodicals and other library resources.
Hardware and software documentation.

Selected articles from such authoritative periodicals as:

Behavior and Information Technology

British Journal of Educational Technology

Educational Communication Technology Journal

Educational Technology

Ergonomics

Human Factors

Cos 196, Introduction To Educational Computing

Instructional Innovator

Programmed Learning and Educational Technology
and others, for example:

Skinner, B. F. (1984). "The Shame of American Education.
American Psychologist, 39 (9) 947-954.

Objectives:

By the end of this course students will be able to demonstrate the operation of a variety of microcomputers and disk operating systems.

*Apply basic knowledge of the psychology of the student - computer interface.

Evaluate commercially produced educational computing software with standard criteria.

Demonstrate instructional used of BASIC and LOGO.

*Express coherent opinions of the past, present and future conditions of educational computing and its social impact.

*Formulate rational points of view regarding educational computing's dual relationship with computer science and educational technology.

Evaluation of Student Learning:

Mastery level proficiency in the objectives listed above is essential to pass this class.

Letter grades will be based on demonstration of critical thinking skills toward the objectives marked with asterisks.

Critical thinking will be measured by 7 in-class exams: only the top scores will count for 50% of the grade.

An in-class presentation will carry 20%; and
a term paper on the same topic will be worth 30%.

Regular class attendance and participation is expected.

UNIVERSITY OF MAINE AT PRESQUE ISLE

Spring 1985

Course Outline

Cos 101, Computer Literacy

Description:

An introductory course including the history, components, control/programming, cultural/economic impact and moral/ethical issues of computers. Students will use microcomputers for word processing and other class assignments.

Instructor Dr. Andrew R. J. Yeaman

Office Hours
Monday: 9:30 p.m. - 10:30 p.m.
Tuesday: 12:05 - 1:05 p.m.
Thursday: 8:00 p.m. - 9:00 p.m.

Office: Folsom 101B

Telephone: 764-0311, Ext 300
Ext 301 (to leave message)

Text and Materials:

Consumer Guide (1984) 1985 Computer Buying Guide: Rating the Best Computers, Peripherals & Software. Publications International Ltd.

Evans, Christopher (1981). The Micro Millenium, New York: Washington Square Press/Pocket Books.

Fox, Annie & Fox, David (1983). Armchair Basic: An Absolute Beginner's Guide to P rogramming in BASIC. Berkeley, CA, Osborne/McGraw-Hill

Hanson, Dick (1983). The New Alchemists. New York: Avon.

Kidder, Tracy (1984). The Soul of a New Machine. New York: Avon.

At least one floppy disk: Verbatim Datalife.

At least two issues of computing magazines: Further details will be given during the semester.

Additional Resources:

Library books and periodicals--also from the public library.

Government publications--especially documents from the Office of Technology Assessment.

Hardware and software documentation.

Math/Science slide/tape collection.

University of Maine motion picture library.

Objectives:

By the end of this course students will be able to:

.Continue their education independently on particular computing topics of meaning and concern to them as individuals.

.Operate an Apple II microcomputer properly.

.Outline the history of computing.

.Discuss the social impact of computing by giving examples.

.Argue the role of computers in future scenarios and draw on authoritative knowledge for support.

.Write simple programs in BASIC.

.Use BASIC programs published in books and magazines.

.Perform the rudiments of electronic text editing and text formatting through the application of word processing.

.Make good decisions about microcomputer hardware and software purchases from assessing needs and interpreting technical specifications and product reviews.

Evaluation of Student Learning:

Two (2) in-class examinations	20	points each
Presentation (to be graded by the audience)..	20	"
Term paper (an improved version of the presentation)	25	"
Quality of participation in class	15	"
	100	"
Extra credit for word processed term paper	5	

Regular class attendance is expected.

Appendix G

UNIVERSITY OF MAINE *at Presque Isle*

Presque Isle, Maine
207/764-0311

To: Dr. J. C. Sheltmire, Chairperson
Division of E/HPER

Fr: Dr. A. R. J. Yeaman
Assistant Professor of Educational Computing

Re: Introduction to Educational Computing

Dt: March 28, 1985

Why should students take Introduction to Educational Computing instead of Computer Literacy?

1. Introduction to Educational Computing will contain a strong computer literacy experience.

2. However, Introduction to Educational Computing would focus on specific applications in educational settings as well as basic computer literacy skills.

3. This would lead to the integration of educational computing throughout the instructional curricula.

4. While specialists are needed, every educator could use the microcomputer to support instruction. Computers should not be mysterious. The benefits of computing are for everyone, not just the experts.

Appendix H

ELECTRONIC TEXT DISPLAY:

An Experiment on the Window Effect

Dr. Andrew R. J. Yeaman
April 12, 1985

ELECTRONIC TEXT DISPLAY: AN EXPERIMENT ON THE WINDOW EFFECT

OVERVIEW

The project will test a hypothesis derived from previous research that suggests the number of windows or electronic pages required to display text influences the reading performance. This factor appears critical in designing electronic text displays for reading long, continuous passages.

The experiment has a posttest control group design. The base treament group will read text through substantially less windows, imaged on a microcomputer screen, than the experimental group. It is hypothesized that the base treatment group will perform significantly better.

Costs expected are $100.00 for publisher's test materials and $30.00 for 5 1/4 inch floppy disks.

Positive impact will be achieved through involving the University's students in a research project giving them first hand exposure to laboratory research. Also, the foundation will be laid for further investigations, possibly fundable by outside sources. Although this is a rural area, the University should demonstrate committment to understanding the high technology which shapes life in an information society.

Results will be submitted for publication to a refereed journal such as Educational Communication & Technology Journal (ECTJ), Visible Language, Reading Research Quarterly, Human Factors, or Ergonomics. Results may also be shared at a national or international conference such as those sponsored by AECT, AERA, ACM, HFS or SID.

The significance of the project is global since the printed page may be supplanted by the electronic screen: this change in reading technology needs to be understood for application to practical educational problems.

TIME LINE

August

Obtain any necessary permissions to conduct research with human subjects. Purchase test materials and obtain copyright clearance to transfer test to microcomputer disks.

September

Assemble materials and apparatus. Develop consent forms and plan procedures. Pilot administration with small sample of student volunteers as subjects.

October

Recruit and schedule participants. Administer experiment. Collect data: approximately 30 hours needed.

November

Data analysis.

December

Write up the results.

January

Submit manuscript for publication.

February

Investigate possibilities for the further funding of this line of research.

INTRODUCTION

Statement of the Problem

While the technology of text displayed on printed paper has developed through trial and error over several centuries, the display of text on electronic screens is becoming widespread without the benefit of much testing beyond visibility of individual characters. Standards for legible printing on paper are set by Tinker's safety zones for print (1963). For usual black on white, upper and lower case printing the major variables are character size, line length and interline spacing. These vary with the font and style of type. Research on reading electronic text has been largely based on the distinction of letters or numbers rather than actual reading. This is mostly due to the initial applications of devices such as cathode ray tubes (CRTs) in military control and command. No standards for reading electronic text exist at present and the effect of reading long, continuous prose passages from electronic display screens needs to be evaluated (Yeaman, 1985).

A substantial difference between the new and the old reading media requires investigation. As hard copy, the pages of a book are their own storage medium and their own display medium. As soft copy, electronic screens must draw upon a secondary storage medium, such as a disk or a chip. This difference changes the technology of reading beyond traditional legibility variables.

Readers of electronic text view the text through a window formed by an area of the display screen. A printed page, such as this one, is also a window into the text. A printed page, however, is a much larger window than that of electronic text displays affordable at present. Several screen windows would be needed to convey this typewriter size page.

Reading a screen may not induce a different reading process, psychologically, from reading printed paper, but a different problem solving process. When only a small window is allowed into the text, the reader may cope by adopting alternative cognitive strategies. Even though it is arbitrarily assigned like a page in a book, the window into the text can itself be unit of meaning. The meaning of a window is what the readers attribute to it from the text displayed there.

A report of an earlier experiment on the traditional legibility variables (Yeaman, 1984) proposes a model for understanding this new variable, the window effect. As the number of screens bearing certain size windows increases, changing the screen and unifying the mental image of each screen's contents could assume a greater load on the reader's mental processing. In other words, an increase in the number of windows acts to lower comprehension. It is not known at what point there is an impairment in reading performance. It is safe to say that such a point probably exists.

The purpose of this experiment will be to seek empirical evidence supporting the window effect as a new variable important to the design of electronic text displays for reading.

Research Hypothesis

The comparison of two different size text windows is proposed as a starting point for investigation. The base treatment display will have the least number of windows to minimize the window effect. The experimental display will have a greater number of windows to maximize the window effect. While the window effect will be varied, the character height, line length and interline spacing will be held constant. Both treatments will display text according to the extrapolated terms of Tinker's safety zone used in previous experimentation (Yeaman, 1984).

It is hypothesized that a group reading the base treatment display will perform significantly better in terms of reading speed and comprehension than a group reading an experimental treatment in which the text is displayed through more windows.

METHOD

Subjects

The target population is adult readers: a population containing approximately equal numbers of males and females, varing in reading ability, visual acuity and age. Subjects will be drawn from fall term classes and offered extra credit for participation. Data from 30 volunteers will be collected and used. All of them will have given permission to be in the study. They will be advised that their participation is voluntary and that they are free to discontinue whenever they wish.

Instrumentation

It is prudent to use valid and reliable methods to investigate the window effect. Analysis of reading time and comprehension provide a theory-based measure to indicate the efficiency of reading. The use of a standardized, normed reading test such as the 13-14 grade Sequential Test of Educational Progress (STEP) provides more realistic measures of reading performance from electronic display screens than scanning rate or letter recognition threshold. Further, standardized and normed reading tests are more likely to demonstrate consistent reliability and validity than reading tests piloted with only a handful of readers (Carmichael & Dearborn, 1947). The choice of the STEP reading test in this study is highly defensible as a good measure of reading.

There will be a five minute warm-up practice test displayed on the microcomputer screen. In the actual experiment, 26 multiple choice questions on 5 passages will be answered in 25 minutes. It is assumed that test performance will indicate the trade-off between reading speed and accuracy made necessary by the window effect.

Materials

The reading test will be displayed on an Apple green screen CRT through Microsoft's WordStar word processing program running on an Apple IIe microcomputer. A Z-80 card in slot 4 will support Digital Research's CP/M DOS. Overlays will be suppressed by editing in the non-document mode.

In the base treatment display, the number of screens conveying the text will total 43, due to a screen format based on Tinker's safety zones for print. In the experimental display, the number of screens will be at least doubled. The comprehesion questions will be displayed identically in each treatment.

Apparatus

Students will read text from the CRT in individual administrations. They will advance the text one screen at a time through the microcomputer keyboard. They will be instructed in this during the practice session. Responses to the STEP multiple choice questions will be marked with number 2 pencils on IBM 805 forms on the table beside the microcomputer. Text in the two formats will be stored on 5 1/4 inch floppy diskettes and loaded into the microcomputer prior to each data collecting session.

Procedures

The procedures will be identical for both treatment groups except that the text will be displayed through a different number of windows to each group. Students will be randomly assigned to the groups. The investigator will follow a written script to guide events as closely as possible to normal STEP administration.

After the answer sheets are collected, the students will be thanked for participating in the study and encouraged to let the investigator know any comments they have about their experience.

Statistical Hypothesis

Students reading the base treatment will show significantly more comprehension and faster silent reading speed than students reading an experimental display with the text conveyed through more windows.

Data Analysis

The answer sheets for each student will be hand scored with a stencil. The comprehension rate will be computed by dividing the reading score by the reading time. The data for each group will be compared through a t-test.

REFERENCES

Carmichael, L. & Dearborn, W. F. (1947). Reading and visual fatigue. Boston: Houghton Mifflin.

Tinker, M. A. (1963). Legibility of print. Ames, IO: Iowa State University Press.

Yeaman, A. R. J. (1984). Electronic books and legibility: A microcomputer simulation. Doctoral dissertation. University of Washington, Seattle, WA.

Yeaman, A. R. J. (1985). Electronic books: Towards a theoretical framework for research. Paper presented at the annual meeting of the Association for Educational Communications and Technology, Anaheim, CA.

Appendix I

TO Dr. Andrew R. J. Yeaman

FROM Dr. Jack C. Sheltmire
Chairperson, Division of E/HPER

DATE June 24, 1985

RE Release Time

Dr. Cohen informed the Division Chairs last week that the release time for research and scholarly activity will not be available for the 1985-1986 academic year. I am very sorry about this because I was the one who proposed the idea and worked hard to have it adopted. Hopefully, this program will be initiated next year. I would encourage you to continue your research and scholarly activity even though this opportunity is no longer available.

I recommend that you speak with Professor MaCleod or Dr. Kimball regarding the Computer Literacy course. You are scheduled for Monday and Wednesday because this time conflicts with Edu 161, Intermediate Educational Computing. Please keep me advised.

Again, I am sorry.

JCS:mah

cc: Dr. Richard Cohen
Prof. John MaCleod
Dr. Richard Kimball

Appendix J

News Release

University of Maine at Presque Isle

Office of University Relations
Clark Ketcham, Director
(207) 764-0311

For immediate release

June 28, 1985

NEWS RELEASE NO. 444

PRESQUE ISLE -- Dr. Andrew R. J. Yeaman, Assistant Professor of Educational Computing at the University of Maine at Presque Isle, recently participated in a statewide conference for Maine librarians and media specialists. The three day conference, held on the Orono campus, was sponsored by the Maine Educational Media Association/ Maine Library Association.

Dr. Yeaman's presentation, entitled "From Osborne to Macintosh," emphasized the value of recent human factors and improvements in the personal computer interface. Using slides and overhead transparencies to illustrate, he further discussed the application of microcomputers to increasing personal productivity.

"Librarians and school media specialists are the information professionals of the public sector. They have a very important role to play in our transition from a petrochemical-based to an information-based society," says Dr. Yeaman.

"From my point of view," he continues, "Libraries for Lifelong Learning, as the theme of this conference, underlines the shift from machine-oriented information technology to people-oriented information technology."

Also in attendance at the conference from the University were: Virginia S. Fischer, Librarian, and Anna P. Mcgrath, Chief Technical Services Librarian.

- 30 -

News Release

University of Maine at Presque Isle

Office of University Relations
Clark Ketcham, Director
(207) 7640311

For immediate release May 3, 1985

NEWS RELEASE NO. 338

PRESQUE ISLE — Dr. Andrew Yeaman, Assistant Professor of Educational Computing at the University of Maine at Presque Isle, recently attended a computer conference held in Augusta for teachers, coordinators, and administrators on using the computer as a tool in Maine schools.

Dr. Yeaman gave a presentation on the necessary steps and procedures to implement educational computing in public school and corporate training programs.

Sponsored by the Maine Department of Educational and Cultural Services in technical association with the Maine Computer Consortium, the day-long conference, entitled "Maine Computers - '85," was designed to advance the application of computer technology at all levels of education and to address the use of computer instruction, administration, supervision, curriculum, and management.

In addition to his participation at the conference, an article, written by Dr. Yeaman and Wm. Clark Ketcham, Director of University Relations at UM - Presque Isle, appeared in the April issue of the Technological Horizons in Education Journal. The article, which appeared on page 18 of the publication, detailed the purpose and curriculum of the new Educational Computing degree at UM - Presque Isle.

Students enrolled in the Educational Computing Program are exposed to a variety of courses and experiences relating to computers in education, plus computer programming, managing a computer facility and its resources, computer technology, and computer field work.

- 30 -

Educational Computing Program Debuts at UMPI

"Introduction to Educational Computing," a new course for teachers, is being offered by the University of Maine at Presque Isle this spring. This is the first course offered in the new Educational Computing Program.

Dr. Andrew Yeaman, Assistant Professor of Educational Computing, emphasizes that this course is just the first to be offered in the new curriculum. "Courses building on this one are planned for the summer and fall as part of the University's intent to develop a Certificate in Educational Computing," says Yeaman. "The introductory class will be part of the required core for the Certificate. Secondary and elementary computer science education will be two of several possible areas of concentration, other options to choose from may be courseware design and the management of school computing facilities."

The four year degree for the Bachelor of Science in Educational Computing provides the base curriculum for the Certificate. The program will be completely underway during the fall semester of 1985.

This program is the first in Maine specifically designed to prepare teachers as computer educators. Dr. Yeaman points out that "...experience with computers...will be in increasing demand...Prospective pre-college educators will find that these skills greatly enhance their job and career opportunities."

Anyone interested in finding out more about the new program should get in touch with Dr. Yeaman at the University of Maine at Presque Isle.

BITNET Update

BITNET is an electronic network that links a number of university and research computer systems around the U.S., Canada and Europe. Messages and files can be transferred among users of the BITNET subscriber systems as easily as electronic mail can be sent between CAPS users. To access BITNET, one must have a full CMS account.

The following is a list of new nodes since the last BITNET update.

ANLMST Argonne National Laboratory
Materials Science and Technology
BINGVAXA State University of New York at Binghamton

Micro-computer session is designed for teachers

"A workshop on what micro-computers can do for teachers will take place March 30 at the University of Maine at Presque Isle.

Entitled, "Improving Teaching With Your Personal Computer," the workshop includes specific instruction on micro-computers and hands-on practice with software.

According to Dr. Andrew R.J. Yeaman, assistant professor of educational computing, the workshop will be geared for teachers who are new to computing and interested in buying a home computer. Practical ideas related to the day-to-day affairs of the classroom will be discussed and range from revising assignment sheets to test construction.

"Micro-computers are very useful in education apart from direct instruction with students," says Dr. Yeaman. "Most teachers do not have computerized classrooms, but could use their own micro-computer for increasing their teaching efficiency. Such activity includes keeping records, calculating grades, word processing, as well as other management tasks teachers undertake outside of class time.

"Perhaps the greatest impact of computing on our schools will be in helping teachers do better what they are doing now," he adds.

Running from 8:30 a.m. to 3 p.m., the workshop will provide demonstrations of the Apple IIe, Apple IIc, and MacIntosh microcomputers as well as hands-on experience with Appleworks software.

The workshop will be limited to the first 15 participants with a deadline of March 23 for registration. The cost for the one-day workshop will be $18.

Interested individuals may contact the university's Professional Development Center for registration information, ext. 334.

* * * * *

WORKSHOPS SCHEDULED IN MARCH AND APRIL

March 30, 1985: IMPROVING TEACHING WITH YOUR PERSONAL COMPUTER
Where: Folsom Hall at UMPI
When: 8:30 a.m. - 3:00 p.m. (12:00 - 1:00 Lunch-on your own)
Cost: $18.00
Limit: First 15 to register (Deadline: March 23, 1985)

This experience will include specific instruction on the Apple IIe, Apple IIc and Macintosh and hands-on experience with Appleworks software. The question, What can microcomputers do for teachers, is addressed; focuses on techniques to improve personal productivity. New skills will be introduced and practical ideas related to the day-to-day affairs of your classroom will be discussed. Conducting the Workshop will be Dr. A.R.J. Yeaman.

Second class postage paid at Bangor Maine 04401 Publication number (USPS 041000)

Aroostook Edition

udy
day. Highs
in teens.
Snow tonight
and
tomorrow.
Lows near
zero. Highs
near 20.
Details on Page 2.

UMPI to offer computing course for teachers

PRESQUE ISLE – "Introduction to Educational Computing," a new course for teachers, will be offered by the University of Maine at Presque Isle this spring semester. The class represents the first course to be offered in the University's new Educational Computing Program and will survey applications of computing in education. According to Dr. Andrew R.J. Yeaman, assistant professor of educational computing at UMPI, "The development of practical, hands-on knowledge and analytic skills (or good decision-making will be an objective of the course.

"Topics to be covered include operating a variety of microcomputers, the psychology of the student-computer interface, instructional uses of BASIC and LOGO languages and, perhaps most important, the social impact of computers," Yeaman said Sunday. Yeaman, who will teach the course, said he anticipates some interesting sessions on the controversies surrounding the installation of microcomputers in American schools at the rate of "hundreds per day."

"However, 'Introduction to Educational Computing' will be just that – an introduction," said Yeaman. "It is not complete wisdom in a can: all you ever need to know about Educational Computing – just add teacher.

"Courses building on this one are planned for the summer and fall as part of the University's intent to develop a certificate in educational computing," said Yeaman.

Originally from England, Yeaman spent the last three years at the University of Washington in Seattle, working on his doctorate. His dissertation research was an experimental study on reading from a simulated electronic book.

Yeaman's continuing research on the electronic book will be addressed in a scholarly paper he will present at the Association for Educational Communication and Technology Conference later this month in Anaheim, Calif.

Introduction to Educational Computing will meet once a week from 6:30 to 9:30 p.m. Mondays. Teachers and students majoring in education who are interested in the class have through Monday, Jan. 14, to register. The first session is scheduled for the last Monday of the month, Jan. 28.

For registration information, contact the UMPI Office of Special and External Programs.

UMPI course to apply use of computer to education

● from page 1

computing, provides the base curriculum for the certificate. The program will be under way during the fall semester. High school seniors and other potential candidates are encouraged to apply early. A selective admission process for the major will be in effect, with only 20 students being accepted the first year, Yeaman said.

"Introduction to Educational Computing will not be a class in computer programming," said Yeaman, "but should be extremely helpful to teachers desiring to expand their instructional repertoire. For instance, the class will have opportunities to experience on-line services, such as information utilities and encyclopedic data bases, which are already being used in some schools."

The introductory class will be part of the required core for the certificate. Secondary and elementary computer science education will only be two of several possible areas of concentration; other options to choose from may be courseware design and the management of school computing facilities," Yeaman said.

The four-year degree for the bachelor of science degree in educational

See UMPI on Page 18

PRESQUE ISLE, MAINE STAR-HERALD

Computer specialist courses to be offered

"Courses for a special educational computing degree designed to prepare students to become computer specialists in the secondary schools will be offered next semester by the University of Maine at Presque Isle. Graduates from the program will be able to teach both computer science and manage school computing facilities, providing support to other teachers.

"The educational computing program will meet the needs of teachers and other school personnel in the development of computer education in Maine's secondary schools," says Dr. Andrew Yeaman, assistant professor of educational computing. "The goal of the program is that the bachelor of science major in educational computing will prepare individuals who will provide expertise in computer-related subject matter at the secondary school level. These individuals will be able both to teach and to help other teachers integrate the computer into the educational process."

"At the present time there are no educational computing degree programs within the State of Maine which are specifically designed to prepare prospective pre-college teachers as computer educators.

"Since knowledge of and experience with computers and related technology will be in increasing demand for the foreseeable future," comments Dr. Yeaman, "prospective pre-college educators will find that these skills greatly enhance their job and career opportunities."

"Students enrolled in the UM - Presque Isle program will be exposed to a variety of courses and experiences relating to computers in education, plus computer programming, managing a computer facility and its resources, computer technology, computer field work in the schools, as well as be exposed to a general and professional education core of courses.

"Graduates will not only be competent in computing technology but also aware of the theoretical foundations of eductional computing," Dr. Yeaman continues. "Practical, technical skills will be gained in the program and so will the necessary analytic skills essential to good decision making."

"Prior to joining UM - Presque Isle, Dr. Yeaman worked for the last three years on his doctor of philosophy degree in educational communications at the University of Washington in Seattle, Wash. His doctoral dissertation, "Electronic Books and Legibility: A Microcomputer Simulation," evaluated reading performances for different text formats displayed by microcomputers in simulation of electronic books.

In addition to continuing research on the future of reading technology, he is interested in developing humane computing environments for education. He has published three articles in the last 10 months to help schools improve their instructional computing facilities.

Dr. Yeaman attended the Hampton School in Middlesex, England from 1961-1966 and received in 1973 an associate of arts degree as a media technician from Bellevue Community College in Bellevue, Wash. At the University of Washington, he earned a bachelor of arts degree in English composition and literature in 1976, as well as a master of education degree with specialization in Educational Communications in 1981.

MEDIACY

NEW EDUCATIONAL PROGRAM OFFERED

The University of Maine at Presque Isle will be offering a new degree in Educational Computing. Courses will be offered beginning next semester and will be designed to prepare students to become computer specialists in the secondary schools. Says Andrew Yeaman, Assistant Professor of Educational Computing, "The goal of the program is that the Bachelor of Science major in Educational Computing will prepare individuals who will provide expertise in computer-related subject matter at the secondary school level. These individuals will be able both to teach and to help other teachers integrate the computer into the educational process." Maine will now be one of the first states in this country to have such a program. In addition to the bachelors degree, an 18 credit certificate program is being developed for teachers and library-media personnel. For more information, please contact:

Andrew R.J. Yeaman, PhD
Assistant Professor and Coordinator
of Educational Computing
University of Maine at Presque Isle
Presque Isle, ME

University Times

University of Maine at Presque Isle — November 9, 1984

an to coordinate program

Photo by Grady Brown

Special," a one-woman musical, opened ity of Southern Maine. Shown are, from left, Director of Theatre and writer of the musical; essor fo Theatre; Holly Cones, as The Girl; as musicians for the shwo; front, Lalain Michaud oth assisting with the production.

to compete Portland

man sity of 1 for itten ector Maine o be e on and

past summer as Diana Devereaux in "Of Thee I Sing," Cones plans to attend graduate school in Theater following graduation.

Musical Direction is provided by Jan Kok, Professor of Music at U.M. - Presque Isle. Kok performs on the recorder while his wife, Evelyn, plays guitar for the production. Both are

Dr. Andrew R. J. Yeaman has been appointed Assistant Professor of Educational Computing at the University of Maine at Presque Isle, announces Dr. Richard Cohen, Vice President of Academic Affairs at UM - Presque Isle. Through his new post, Dr. Yeaman will coordinate UM - Presque Isle's new Bachelor of Science degree program in Educational Computing, specifically designed to prepare prospective pre-college teachers as computer educators.

Prior to joining UM - Presque Isle, Dr. Yeaman worked for the last three years on his Doctor of Philosophy degree in Educational Communications at the University of Washington in Seattle, Washington. His doctoral dissertation, "Electronic Books and Legibility: a Microcomputer Simulation," evaluated reading performances for different text formats displayed by microcomputers in simulation of electronic books.

In addition to continuing research on the future of reading technology, he is interested in developing humane computing environments for education. He has published three articles in the last ten months to help schools improve their instructional computing facilities.

Dr. Yeaman has worked at the University of Washington in a number of capacities including that of a Research Assistant, a Production Assistant for the Fire Service Education Program, and at the Information Desk in the Suzzallo Library. Additionally, he has served as a Media Specialist and Director of the Media Center for the Interlake High School in Bellevue, Washington, from 1979 - 80. Other positions include serving as a Substitute Teacher for the Seattle schools, Librarian's Assistant for the University of Washington, and a Media Technician for the Bellevue Junior High School from 1974-76 and at the College of the Canyons from 1973-74.

His interests include research and development in educational applications of microcomputers, the systematic instructional design of courseware, and motion pictures in education.

Dr. Yeaman's research areas include office automation and environmental design, improving microcomputer learning facilities, the future of the printed word, cross-cultural communication and telecommunications.

His professional memberships include the Association for Educational Communications and Technology and the Human Factors Society.

Dr. Yeaman attended the Hampton School in Middlesex, England, from 1961 - 1966 and received in 1973 an Associate of Arts degree as a Media Technician from Bellevue Community College in Bellevue, Washington. At the University of Washington, he earned a Bachelor of Arts degree in English Composition and Literature in 1976, as well as a Master of Education degree with specialization in Educational Communications in 1981.

Appendix K

EDUCATIONAL COMPUTING

University of Maine at Presque Isle

PATHFINDER

A unique Bachelor of Science major in Educational Computing is now offered by the University of Maine at Presque Isle. Graduates of the four-year innovative program will be prepared to serve as computer educators and computer specialists in secondary schools. Graduates will be able to teach both computer science and manage school computing facilities, provide support to other teachers, as well as give business-based computer training programs. Businesses will also benefit from the program because of the broad experience that students will develop in the general field of educational computing.

Graduates are not only competent in computing technology, but also are aware of the theoretical foundations of educational computing. Practical, technical skills will be gained in the program as well as the necessary analytic skills essential to good decision making. Potential candidates for this new field should possess high quantitative and qualitative abilities as demonstrated by math/science and verbal/writing excellence. A selective admission process is in effect.

Because computers as a communication technology will evolve considerably in subsequent years, the University of Maine at Presque Isle intends to do more than require students in the Educational Computing program to simply master current information and techniques. Students will be prepared to learn throughout their professional lives and engage in active, independent and self-directed learning. Therefore, the University seeks to attract not just students with the quantitative skills essential to becoming Computer Science educators, but also students who engage in critical thinking, intellectual analysis, proficiency in communicating and an awareness of social concerns. Graduates will be able to manage the transitions related to the use of computers in education: they will be able to gather and assess data critically and rigorously, to grasp and use basic concepts and principles, and finally to identify, formulate and solve problems.

Rapid expansion of computing facilities is anticipated. Students will be provided with access to a representative sampling of the variety of microcomputer hardware and software currently found in secondary education and in business. There is also a strong commitment to a futuristic view through the acquisition of hardware and software that is state-of-the-art.

At this time there are no set standards in Maine for teacher certification in Educational Computing. Therefore, students in the program who in-

tend to teach in the public schools are advised to complete sufficient coursework in a certifiable subject. However, the University will actively work with the Department of Education towards establishing certification criteria.

The University of Maine at Presque Isle is ideally located on the outskirts of Presque Isle, Aroostook County's largest city. The campus combines the charm of a rural setting with access to a small city atmosphere.

The 150-acre campus provides a blend of many new, modern brick buildings with the traditionally styled structures. Architecturally, the campus is warm and receptive as is the University community characterized by a close rapport among students, faculty and the administration.

Aroostook County, Maine's largest county, is noted for its friendly, hospitable people and its unspoiled natural beauty. "The County" still retains a bit of the lively frontier atmosphere which made it famous.

For more information, contact the Office of Admissions, 181 Maine Street, Presque Isle, Maine or call (207)764-0311, Ext. 405.

University of Maine at Presque Isle
Admissions Office
181 Main Street
Presque Isle, Maine 04769

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BACHELOR OF SCIENCE IN EDUCATIONAL COMPUTING

A new Bachelor of Science major in Educational Computing is offered by the University of Maine at Presque Isle. Graduates of the 4-year innovative program will be prepared to serve as computer educators and resource personnel for secondary schools and businesses. Graduates will be able to both teach Computer Science and manage school computing facilities, providing support to other teachers.

The need for individuals to fill this role was substantiated by an UMPI survey of Maine superintendents and guidance counselors. Approximately two-thirds of each responded that there was a need for such personnel in their schools during the next five years.

Graduates will not only be competent in computing technology but also aware of the theoretical foundations of educational computing. Practical, technical skills will be gained in the program and so will the necessary analytic skills essential to good decision making. Potential candidates for this new field should posses high quantitative and qualitative abilities as demonstrated by math/science and verbal/writing excellence. A selective admission process will be in effect with only 20 students being accepted this first year.

Because computers as a communication technology will evolve considerably in subsequent years, UMPI intends to do more than require students in the Educational Computing program to simply master current information and techniques. Students will be prepared to learn throughout their professional lives and engage in active, independent and self-directed learning. Therefore, UMPI seeks to attract not just students with the quantitative skills essential to becoming Computer Science educators but in addition demands critical thinking, intellectual analysis, proficiency in communicating and awareness of social concerns. Graduates will be able to manage the transitions related to the use of computers in education: they will be able to

gather and assess data critically and regorously, to grasp and use basic concepts and principles and identify, formulate and solve problems.

Through the four years of this course of study there will be intense contact with computers to build programming, technical, practical and teaching skills. At this time, UMPI has 14 Apple II+/E/C microcomputers and 1 Commodore and 1 TRS. There are several printers and a graphics plotter. There are four terminal ports to the IBM 370 series mainframe at Orono also.

Rapid expansion of computing facilities is anticipated in the next few months with funds allocated for the new program in Educational Computing. Students will be provided with access to a representative sampling of the variety of mocrocomputer hardware and software currently found in secondary education and in business. There is also a strong commitment to a futuristic view through the acquisition of hardware and software that is state-of-the-art.

Student input on these matters is expected at special meetings beyond regular coursework. These seminar sessions will provide a forum for intellectual sharing and academic exchange between students and faculty. They will also encourage contact among program members and provide continuity. There will be guest lecturers, student presentations on current issues, software and hardware previews and discussions of research reports. After all, people is what educational computing is all about.

Suggestions for further reading:

Several substantial articles discussing the role and importance of computers in education can be found in each of these periodicals available in your school or public library: Byte (June 1984), Instructional Innovator (February 1984), Personal Computing (September 1984) and Psychology Today (September 1984).

For further information please contact:
Dr. Andrew R.J. Yeaman
University of Maine at Presque Isle
Presque Isle, ME 04769
Telephone: (207) 764-0311, Ext. 300 or 301

This course of study should help provide some insight to some of these provoking questions:

With the development of transparent operating systems should everyone learn to program?

What are the myths of the technological fix in education?

What psychological principles of cognition are evoked by the human-computer interface?

Is it fair to criticize most educational computing software as electronic page turning?

The Library of Congress is spending millions of dollars to store books on laser videodiscs--why?

Why do many people working with computers complain of eyestrain, muscle aches and psychological distress?

What do we know about computers and health hazards such as miscarriages in regards to radiation emission and bioelectromagnetics?

What are the principles of good design in computer-assisted instructor?

What are the advantages and disadvantages of computer interactive video?

Should computers be tools or machines and how will your answer change your role as a computer educator?

Appendix L

UNIVERSITY OF MAINE *at Presque Isle*

Executive Officer for Institutional Services

Presque Isle, Maine 04769
207/764-0311

March 18, 1985

Dr. Andrew Yeaman,
Assistant Professor of Educational
Computing
University of Maine at Presque Isle
Presque Isle, Maine 04769

Dear Andrew:

We are extremely grateful to you for the outstanding presentation you made to those attending the Computer Assisted Farming Workshop. Moreover, all of the preliminary work you did to make this possible has not gone unnoticed and unappreciated!

The participant evaluations were excellent. You should be happy to know that you were specifically mentioned as the outstanding presentor on several of the forms.

Again, we sincerely appreciate your support and participation.

Sincerely,

George

George A. James, Ph.D.
Executive Officer for Institutional Services

GAJ/bh

cc: President Carlson
Dr. Richard Cohen

MEMO

TO Dr. Richard Cohen
Vice President for Acacemic Affairs

Dr. James Haviland
Director of Special & External Programs

Dr. Richard Kimball
Professor of Mathematics

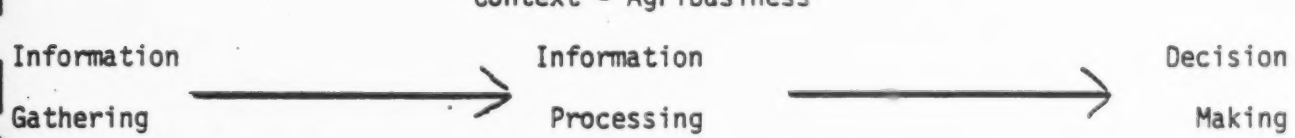
FROM Dr. Andrew R. J. Yeaman
Professor of Educational Computing Andrew R.J. Yeaman

DATE December 11, 1984

SUBJECT: Computer Assisted Farming

I suppose one day this phrase "computer assisted" will disappear if the current trends in computing continue with computers becoming easier to use, less obtrusive and and eventually ubiquitous. I have been thinking about the transition to that day in relation to the University and the farming community.

Here is the conceptual framework:



I do not anticipate computers making decisions directly, but I do believe they can help farmers by providing a finer foundation for rational decision making. Both information gathering and information processing are agribusiness tasks which have benefitted in the past from advances in communication technology. The personal computer allows further intensification of these steps towards making better choices.

I will add a word or two of caution here in regard to the diffusion of communication technology: It is successful when it helps people do better what they were doing before. It may develop into something totally new but that is not a good place to start. To be more concrete: I do not believe the University should try to turn farmers into programmers or into accountants. The University should pass on the new knowledge for locating and sorting information more efficiently and more effectively so as to enable better agricultural decisions.

The proposed informational meetings should result in an exchange of ideas. How the University will proceed is one side of this and will deal with that in a moment. The other side is task analysis of farming: What information do farmers look for when making decisions? What do they need? How do they get their information? What problems do they want to solve? What decisions do they want to make? How may the communication process be improved so better decisions are made? And, referring to the diagram, how may computers help farmers find better data and massage it properly? The answers to

questions need to be matched up with information providing services and information management systems. The precedents are in videotex services and spreadsheet software, specifically templates.

Online farm information services revenues reached $9 million in 1983 and are expected to grow to $65.3 million in 1988. The most successful system in AgriData Network. Other vendors are Professional Farmers of America and Grassroots from Times-Mirror's Videotex America. There have been some states and federal projects to increase access, such as the American Farm Bureau videotex trials, but apparently not in Aroostook.

The videotex offerings are comprehensive: electronic mail, weather information, commodities pricing, farming news, general news, grain and livestock market information, a business encyclopedia of agriculture, farm management modeling and analysis and forecasting programs among others.

The effect of these rich information sources is amplified by worksheet software which allow better record keeping and better projections. "We could keep track of the hogs we sold in dollars but we couldn't keep track of them by pounds and numbers at the same time...(Now) you can charge your hogs the cost of the feed when you sell them and figure out if you're making any money...We never had this kind of information before. It would have taken too long to calculate but we knew we needed it."

Software is a very big business today and canned software for the farm is emerging as a profitable channel. Harris Technical Systems of Nebraska, for instance, has about 20 products in its AgDisk line--most of them VisiCalc templates. However, hardware has pushed the state-of-the-art forward by increasing memory to a standard of 512K. This allows the use of the new Lotus products with integrated word processing, spreadsheet and database. An important decision to make would be to teach about using the whole package or to keep it simple and teach how to use certain templates. Custom templates for Aroostook may be a possibility. These issues lead into instructional strategy, the next aspect I will address in this memorandum. Incidentally, a good source for the newest software should be Farm Computer News. It's put out bimonthly by Successful Farming, and the first issue is due in January. The University ought to subscribe--the annual rate is $20.

My philosophy does not ask the University to make farmers computer literate; they do not need a globally descriptive course on computers and society. My vision is to give them tools to do their job better as they perceive it and to show them how to use those tools. It does seem likely that some people will continue by enrolling in future University offerings in computer science but that is not the main objective.

Teaching people about computers results in a different behavior than teaching people to use computing power for a particular application. That is, theoretical generalization will not be so useful to farmers as practical specifics. While the University's Apple II +/e/c microcomputers have been fairly satisfactory to date for broad-based academic instruction, they would probably not be suitable for farmers given this unique situation.

Converging with this point is my belief the University should offer hands-on instruction: There should be direct learning about the actual software and hardware. Contact with the computers should not end with the period of instruction and only resume upon a substantial purchase at an undefined time. Ideally, our clients should be

so committed that they come to the University for their special sessions and write one check to pay for instruction and the prescribed hardware, software and on-line services. When they leave, they take their computers and their know-how with them. Although the University is not a vendor, this appears efficient as are required textbooks and laboratory fees. Passing on an academic discount would be an additional attraction.

The selected systems should be of business quality but also pay high attention to human engineering requirements. The 512K Macintosh offers ease of learning and use whereas the Panasonic Sr. Partner offers more portability and everything--including the printer--in one suitcase. These demands should be made of the designated software, too; probably the integrated Lotus products: Symphony on the IBM--compatible Panasonic and Jazz on the Macintosh.

Obviously such a course offering would only address a certain economic niche and I anticipate Mr. Lawrence Thibodeau pointing this out. Perhaps the answer to this objection is in examining the characteristics of the new technology itself. While I would like to put the suggested plan into action, a wider-reaching solution may be a year away and depend on a federal or a state grant for this region.

I believe microcomputers are a democratizing invention like photography. The impact of that communication technology is to allow anyone to record visual events and convey them to anyone else. No longer are drawing lessons prerequisite: Visual communication is not restricted to artists or those who can hire them. Anyone can snap a picture whether to record a personal moment or to explain a traffic violation to a judge.

Computing likewise redefines not only what people do but how they think. Computing provides access and analytic skills that never existed before and therefore alters the world. It also changes individuals--they think differently about themselves: Computing does something to them

With these thoughts in mind, I propose the University reach out to the members of the farming community who are unwilling or unable to put money into computing. While there would be many obstacles to erecting a public computing facility in each population center in Aroostook, it would be a comparitively small matter to install microcomputers, agricultural software and on-line videotex services in each public library. Instruction would be provided through workshops and training of library staff. The key to the feasibility of this plan lies in the potential for farmers to store data on their own disks and run them on the library computers. Also, farmers wishing to improve production do not need to use a computer every day. Having nibbled, perhaps more would buy their own equipment. Placing computers in public libraries for farmers to use is a natural outgrowth of public library functions. The librarians think of themselves as information brokers, not just as book-people. Standing outside the private sector concerns of knowledge as a commodity, the American Library Association is dedicated to the preservation of public service and upholds equal and ready access to information. This is a widely held philosophy in the profession of librarianship.

My informal conversation with Mrs. Marilyn G. Clark, Presque Isle Librarian, revealed there are 14 public libraries in Aroostook. For each there is dual governance--from the particular city and from Augusta. The locations are: Ashland, Caribou, Fort Fairfield, Fort Kent, Houlton, Island Falls, Limestone, Madawaska, Mars Hill, Patten, Presque Isle, Sherman, Van Buren and Washburn. Do to the low socioeconomic and remote

geographic conditions of the County, grant writing appears as one good way to bring this project to fulfillment but there may be other approaches. For library locations I would select computing systems which are easy to use and easy to learn how to use such as Macintosh. Mrs. Clark clearly indicated the public libraries' desire to keep up with the information age and to adopt computer access as part of their repertoire.

I sincerely hope this has been one of the more tantalizing memos you have received this year and that you share my enthusiasm. I am asking Dr. Cohen to arrange for us to meet so we may plan a couple of informational sessions for the community and decide how to make things really happen.

ARFY:mah

cc: Charles Bonin
Business Manager

UNIVERSITY OF MAINE *at Presque Isle*

MEMORANDUM

Presque Isle, Maine
207/764-0311

TO: DR. RICHARD COHEN

FROM: DR. ANDREW R. J. YEAMAN Andrew R.J. Yeaman

RE: CAF INFORMATIONAL SESSIONS

DATE: JANUARY 4, 1985

The purpose of the informational sessions will be to acquaint members of the agribusiness community with the University's projected activity in Computer-Assisted Farming (CAF). As a non-credit course, the University plans to offer an intensive weekend in CAF that gives practical experience. At the end of Sunday afternoon, the class members leave with their equipment and software, ready to put it to work. The course content will fit a simple model for improving rational decision making: online services assisting in information gathering and electronic spreadsheets assisting in information processing.

The objective of the information sessions will be to encourage sufficient people to sign up for the course and, secondarily, to interest others in the concept of CAF. The range of the cost will be $3,000 to $5,000, which is what anyone pays to really get started--with all the inconvenience of muddling through alone. A minimum number of enrollments would probably be 10--as a guess but it might be lower--with a ceiling of 15-20. An enrollment means up to two people from a family. They will have hands-on training on the equipment they have paid for. This is a vastly superior way of going about getting CAF off the ground than a series of classes which give some basic information but do not actually get people started.

The University is not merely selling a service but asks for commitment. What we are actually looking at is the shaping of culture, the way of life in Northern Maine. We will know the job has been done well upon seeing changes in behavior affecting many people. Therefore this project needs input from the ground level in formative evaluation as well as summative evaluation to judge effectiveness.

/Cont'd.

Tangible measurement is quite just: Those who continue to do well in business are those who make the best decisions. As I understand it, the position of the Agricultural Advisory Committee is that the capacity for making good decisions in agribusiness can be augmented by computing: Computers have become indispensable tools for achieving success. Thus, the rationale for the project I have been given to manage as community service activity is to make CAF more widely available to those lower on the social pyramid who have correspondingly not computerized yet: That the position of the University is to encourage farmers to divert their cash flow into computing and to provide them with some instructional support.

We want to change behavior from non-computing to computing. People who use computers in CAF an similar contexts engage in a set of particular behaviors: They use a computer at least three or four times a week for a work-related activity, they play with a computer or a program to learn more about it, they talk about computing with other people informally, they join users' groups, they sometimes take classes, they subscribe to and read monthly computing magazines, they buy books on computing and they buy new computing items. Their emphasis, however, is on product or purpose but not on the process which should be routine and invisible. How-to becomes fine-tuned and increasingly automatic, although it takes about 5,000 hours to gain expertise in anything.

The University's program for CAF must recognise these factors and they should be part of the longterm evaluation, perhaps feeding back into subsequent groups. This will give strength to the proposal to give CAF access to a wider audience through the public libraries.

Informational Sessions: Objectives

To obtain a minimum of 10 enrollments in the non-credit course; to convince people to direct their cash flow into CAF.

Sensitize others about CAF possibilities for future University developments.

Gather input to refine the non-credit course and make it more successful.

/Cont'd.

Informational Sessions: Strategies

Give a convincing explanation of how computing can improve agribusiness through better decision making.
Demonstrate operation of Macintosh.
Demonstrate using Multiplan and AgDisk templates.
Demonstrate using online information services for agriculture.
Summarize with a tentative outline of the non-credit course activities.

In general, these sessions should be interesting, highly visual demonstrations. The verbal content must not go too deep. There should be some hands-on possibilities for those who want that. There must be access to University faculty who can listen to discussions of the issues. This last step will be crucial to formative evaluation.

The faculty involved will need knowledge and practice and will need to prepare materials for very convincing demonstrations. This requires financial support for computers and software for them to work with as well as instructional materials. I will communicate more precise needs as soon as possible.

ARJY/oli

cc: Dr. Constance Carlson
Dr. James Kenney
Dr. Jack C. Sheltmire

University of Maine *Presque Isle*

TO: DR. RICHARD COHEN

FROM: DR. ANDREW R. J. YEAMAN

RE: COMPUTER-ASSISTED FARMING

DATE: JANUARY 16, 1985

Here is the list of needs for the informational sessions--see my memorandum of January 4. The same people and supplies should be sufficient to support the weekend, non-credit course. However, the informational sessions may demand some fine-tuning of expectations.

Instructors/Demonstrators:
Basic operation and use of Macintosh: Dr. Shellie-Helane Levine
Multiplan and AgDisk templates: Dr. Judy Smarr
AgriData information service: Mr. Dennis J. Frank

Since I am suggesting these names to you, I have not spoken about their involvement in this project. Each University person should be paired with a person from the community who is knowledgeable in the agribusiness application area.

Equipment:
Mach 2 with Macintosh (512K)
(Large screen, high resolution projection system: includes Macintosh, video interface, 6' screen, cables and handheld light pointer: completely installed and tuned. Screen size can be as large as 20').
Vendor:
Professional Data Systems
20 Sunnyside Avenue
Mill Valley, CA 94941 (Attention: Candace Bloomquist)
Cost:
$8190
(415) 383-5537

Two each of the following:
Macintosh (512K)
Macintosh External Disk Drive
MacSecurity Kit
Apple Modem 1200 w/ Mac Acc Kit
MacTerminal
ImageWriter w/Mac Acc kit
Macintosh Numeric Keypad

plus 6 boxes of MacApple 3.5" Blank Diskettes

Vendor:
Apple Computer
Educational Purchase Program '84
171 Locke Drive
Marlborough, MA 01752

(Dr. Richard L. Kimball can coordinate this into the Apple/Maine purchase agreement).

Installing Dealer:
Harper Electronics
114 Commercial St.
Portland ME 04101
Estimated cost:
$6840
(207) 772-1156

Software:
Mac Coach by ATI: $45
Microsoft Multiplan (for Macintosh): $125
Suggested Vendor:
Compuclassics
6934 Canby Street, Suite #104
Reseda, CA 91335
(800) 328-4473

Harris AgDisk products (specify for Macintosh):
Crop/Livestock Profit Projector: $95
Multiplan Templates:
Farm Machinery Management: $95
Crop Management: $95
Farm Business Management: $95
Shipping etc.: $10
Vendor:
Harris Technical Systems, Inc.
624 Peach Street
P.O. Box 80837
Lincoln, NE 68501
(402) 476-2811

Filevision for Macintosh: $195
Vendor:
Telos Software Products
3420 Ocean Park Blvd.
Santa Monica, CA 90405
(213) 450-2424

The equipment and software should be ordered soon so the informational sessions can take place in the month of February as planned.

AgriData Online Services:
Basic User Fee: $199 (for first six months, $39/month thereafter)
Connect time at 1200 baud: $30 per hour
Information charges (approximation): $10 per hour
Estimated cost: $500
Vendor:
AgriData Resources, Inc.
205 West Higland Ave.
Milwaukee, WI 53203
(800) 558-9044

UNIVERSITY OF MAINE *at Presque Isle*

Presque Isle, Maine
207 764-0311

MEMORANDUM

To: Dr. George James
Dr. James Haviland

Fr: Dr. Andrew R. J. Yeaman A.R.J. Yeaman

Re: Winter Classes for Agribusiness

Dt: February 6, 1985

As a piece of classroom teaching equipment the Mach 2 computer video projector should be equipped with these items, available from Apple at the educational discount.

Quantity	Item	@(approx.)	Total
1	MacSecurity kit	28.00	28.00
1	Macintosh Extend Disk Drive	346.50	346.50
1	ImageWriter w/Mac. Acc. kit	417.00	417.00
2	Macintosh Numeric keypad	99.00	198.00
3 boxes	MacApple 3.5" blank disks	34.30	102.90
		Approximate Total	1091.00

To have all of the Macintosh computers that the University is purchasing fully functional, this software is also needed.

Quantity	Item	@(approx.)	Total
3	Microsoft Multiplan	107.00	321.00
3	Microsoft Word	107.00	321.00
3	Microsoft Chart	69.00	207.00
3	Microsoft File	107.00	321.00
3	Microsoft Basic	83.00	249.00
		Approximate Total with educational discount from Microsoft (see attachments)	1419.00

The Microsoft books below should be combined into the order above to attain the 45% educational discount. Two copies of each would be the most efficient way of disseminating them to workshop instructors.

Quantity	Item	@(approx.)	Total
2	Getting Started with Microsoft Word	10.00	20.00
2	Managing your Business with Multiplan	10.00	20.00
2	Word Processing Power with Microsoft Word	10.00	20.00
2	The Apple Macintosh Book	10.50	21.00
2	Presentation Graphics on the Apple Macintosh	10.50	21.00
2	MacWork/MacPlay	10.50	21.00
		Approximate Total	123.00

Appendix M

T · H · E

TECHNOLOGICAL HORIZONS IN EDUCATION

JOURNAL

Vol. 12, No. 8, April, 1985

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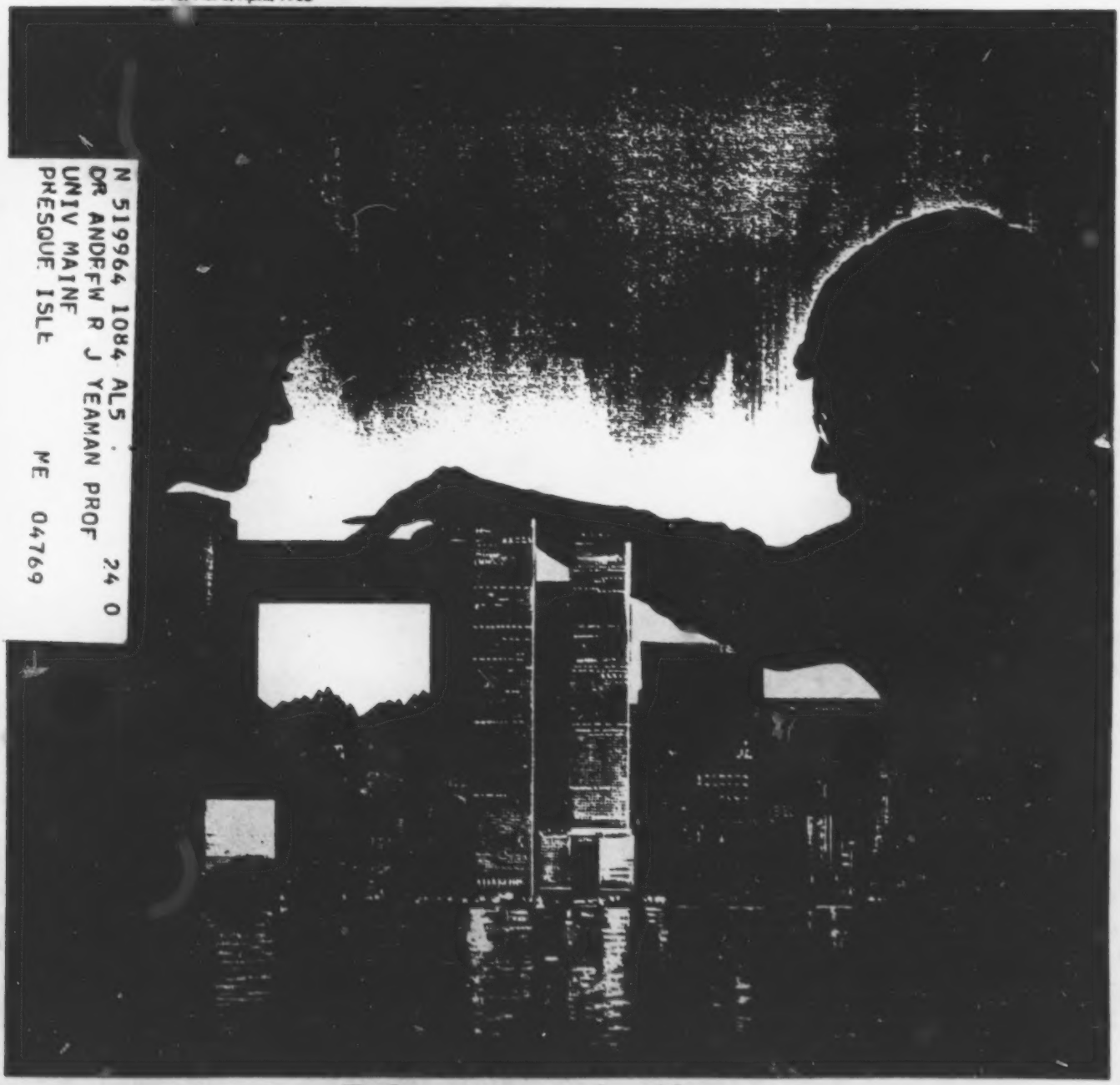
DR ANDFFW R J YEAMAN PROF 24 0
UNIV MAINF
PRESQUE ISLE ME 04769



Telecommunications

News *(continued)*

Science Academy To Open in Austin

The Austin Science Academy, a magnet school for science, math and computer education, will begin formal classes for high school freshmen and sophomores in September.

The school-within-a-school, located at Lyndon B. Johnson High School in the Austin, Texas Independent School District, will be expanded to juniors in 1986 and seniors in 1987.

The academy program will feature innovative teaching methods, a low pupil/teacher ratio, interdisciplinary curriculum, emphasis on research applications, mentorships, and access to many types of technological equipment, said John Friedrick, academy director.

Several donations from industry have been made to the academy. Texas Instruments, Inc. had donated 20 transportable Professional Computers and 20 Omni 800 Model 850 printers.

The Professional Computers will be configured with 256 Kbytes of RAM, a color monitor and a dual floppy-disk drive. They will also be equipped with MS-DOS 2.1 and BASIC software. The Model 850 printer is a bidirectional printer which has raster graphics capabilities for producing hard copy from a video display, including graphics as well as text.

TI has also agreed to participate in mentorships and internship programs with selected academy students and teachers.

IBM has also donated a scanning electron microscope which can magnify objects up to 100,000 times their normal size. Academy students will be able to use the electron microscope in such applications as examining the structure and composition of cells and tissues and studying the alloying effects of certain elements on metals, an IBM spokesman said.

Write No. 414 on Inquiry Card

Software Included In Disk Package

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Write No. 405 on Inquiry Card

Courses Offered For Educational Computing Degree

Courses for a special educational computing degree designed to prepare students to become computer specialists in the secondary schools will be offered beginning this year by the University of Maine at Presque Isle.

Graduates from the program will be able to teach both computer science and manage school computing facilities, providing support to other teachers.

"The educational computing program will meet the needs of teachers and other school personnel in the development of computer education in Maine's secondary schools," said Dr. Andrew Yeaman, assistant professor of educational computing. "The goal of the program is that the bachelor of science major in educational computing will prepare individuals who will provide expertise in computer-related subject matter at the secondary school level. These individuals will be able both to teach and to help other teachers integrate the computer into the educational process."

Students enrolled in the program will be exposed to a variety of courses and experiences relating to computers in education, plus computer programming, managing a computer facility and its resources, computer technology, computer field work in the schools, as well as be exposed to a general and professional education core of courses.

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(continued on page 20)

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Appendix N

UNIVERSITY OF MAINE *Presque Isle*

TO: Dr. R. Cohen

Dr. R. L. Kimball

Dr. J. C. Sheltmire

FR: Dr. A. R. J. Yeaman

RE: University facilities

DT: May 28, 1985

As you have probably anticipated, lab space for the Educational Computing program will be needed. I would like to suggest using Folsom 101B for that purpose:

- Access to special software and hardware in a closed lab would be available.
- Computer-based interactive video production facilities could be established.
- Supervision of both activities listed above would be possible.
- Seminars and small group workshops could be held.
- Research utilizing computer software and hardware could be initiated.

Appendix O

BIBLIOGRAPHY

TK 5102.5 C66
Cooper, E. (1984). Broadband Network Technology. California: Sytek Inc.

QA 76.6 F87
Futrell, M. and Geisert, P. (1984). The Well-Trained Computer. New Jersey: Educational Technology Publications.

QA 76.8 A66 G66
Good, P. (1983). A Critic's Guide To Software For Apple and Apple-Compatible Computers. Pennsylvania: Chilton Book Company.

QA 76.6 G65
Good, P. (1983). A Critic's Guide To Software For CP/M Computers. Pennsylvania: Chilton Book Company.

LB 1025.2 I646
Reigeluth, C. (1983). Instructional-Design Theories and Models. New Jerse : Lawrence Erlbaum Associates Publishers.

LB 1043 R43
Reiser, R. and Gagne, R. (1983). Selecting Media for Instruction. New Jersey: Educational Technology Publications.

LB 1028.35 R65
Romiszowski, A. (1981). Designing Instructional Systems. New York: Nichols Publishing.

LB 1049 S73
Springer, G. (1984). Electronic Notebook. Oregon: dilithium Press.

QA 76.5 W286
Walter, R. (1984). The Secret Guide To Computers. Boston.

QA 76. W45
Weinberg, G. (1971). The Psychology of Computer Programming. New York: Van Nostrand Reinhold Company.

Government Documents
Office of Technology Assessment
Dr. Andrew Yeaman

BIBLIOGRAPHY

Y3.T22/2:C73/6
Computer-Based National Information Systems: Technology and Public Policy Issues (September 1981).

Y3.T22/2:2C7/3/6/sum.
Computer-Based National Information Systems: Technology and Public Policy Issues (summary) (October 1981).

Y3.T22/2:2C73/8
Computerized Manufacturing Automation: Employment, Education, and the Workplace (April 1984).

Y3.T22/2:2F49
Effects of Information Technology on Financial Services Systems (September 1984).

Y3. T22/2:2F49/sum.
Effects of Information Technology on Financial Services Systems (September 1984).

Y3.T22/2:2E12/2
Implications of Electronic Mail and Message Systems for the U.S. Postal Service (August 1982).

Y3.T22/2:2In3/2
Informational Technology and Its Impact on American Education (November 1982).

Y3T22/2:2In3/2/sum.
Informational Technology and Its Impact on American Education (September 1982).

BIBLIOGRAPHY

QA
76.17
E92
1981 Evans, C. (1981). The Making of the MICRO. New York: Van Nostrand Reinhold Company.

371.3
F629i Fleming, M. & Levie, H. (1978). Instructional Message Design. New Jersey: Educational Technology Publications.

LB
1028.75
H36
1982 Floyd, S. & Floyd, B. (1982). Handbook of Interactive Video. New York: Knowledge Industry Publications, Inc.

LB
1028.5
H36
1984 Heines, J.M. (1984). Screen Design Strategies for Computer-Assisted Instruction. Massachusetts: Digital Press.

371.33
K32p Kemp, J. (1963). Planning and Producing Audiovisual Materials. Pennsylvania: Chandler Publishing Company.

LB
1028.5
L38
1983 Lathrop, A. & Goodson, B. (1983). Courseware in the Classroom. California: Addison-Wesley Publishing Company.

LB
1028.4
M4 Media, the Learner, and Intellectual Freedom a Handbook. (1979). Washington D.C.: Association for Educational Communications and Technology.

T
49.5
P3
1983 Pacey, A. (1983). The Culture of TECHNOLOGY. Massachusetts: The MIT Press.

QA
20
C65
P36 Papert, S. (1980). Mindstorms. New York: Basic Books, Inc. Publishers.

LB
1028.3
S37 Schramm, W. (1977). Big Media Little Media. California: Sage Publications.

TK
5105.5
V52 Sigel, E. (1980). Videotext. New York: Knowledge Industry Publications, Inc.

LB
1028.43
U8
1984 Terry, C. (1984). Using Microcomputers in Schools. New York: Nichols Publishing Company.

EDUCATIONAL COMPUTING
Dr. Andrew Yeaman

LB
1028.5 Walker, D. & Hess, R. (1984). Instructional Software. California:
I54 Wadworth Publishing Company.
1984

LB
1028.5 Wilkinson, A.C. (1983). Classroom Computers and Cognitive Science. New
C525 York: Academic Press.
1983

LA
217 Goodlad, John I. (1984). A Place Called School. New York: McGraw-Hill
G654 Book Company.
1984

510.1 Hofstadter, Douglas R. (1979). Godel, Escher, Bach: an Eternal Golden
H677e Braid. New York: Basic Books, Inc., Publishers.

LB
2324 McCredie, John W. (1983). Campus Computing Strategies. Massachusetts:
C35 Digital Press.
1983

BIBLIOGRAPHY

QA
76.8
A6623
A6 — Apple IIe Owners Manual. (1982). California: Apple Computer, Inc.

LB
1028.5
B873 — Burke, Robert L. (1982). CAI Sourcebook. New Jersey: Prentice-Hall, Inc.

LB
1028.5
B47 — Bitter, Gary G. and Camuse, Ruth A. (1984). Using a Microcomputer in the Classroom. Virginia: Reston Publishing Company, Inc.

LB
1028.46
D4 — Dean, Christopher and Whitlock, Quentin. (1984). A Handbook of Computer-Based Training. New York: Nichols Publishing Company.

LB
1028.3
V53 — DeBloois, Michael L. (1982). Videodisc/Microcomputer Courseware Design. New Jersey: Educational Technology Publications.

LB
1028.5
Y67 — Frank, Mary. (1982). Young Children in a Computerized Environment. New York: The Haworth Press.

LB
1028.5
H38 — Hawkridge, David. (1983). New Information Technology in Education. Maryland: The John Hopkins University Press.

LB
1028.5
M9 — Hunter, Beverly. (L984). My Students Use Computers - Computer Literacy in the K-8 Curriculum. Virginia: Reston Publishing Company, Inc.

LB
1028.5
S73 — Steinberg, Esther R. (1984). Teaching Computers to Teach. New Jersey: Lawrence Erlbaum Associates, Publishers.

LB
1028.5
C547 — Taylor, Robert P. (1980). The Computer in the School - Tutor, Tool, Tutee. New york: Teachers College Press.

LB
1028.3
F87 — White, Mary Alice. (1983). The Future of Electronic Learning. New Jersey: Lawrence Erlbaum Associates, Publishers.

LB
1028.5
W525 — Williams, Frederick and Williams, Victoria. (1984). Microcomputers in Elementary Education. California: Wadsworth Publishing Company.

EDUCATIONAL COMPUTING
Dr. Andrew Yeaman

LB
1028.46
W54 Willis, Jerry W., Johnson, D. LaMont and Dixon, Paul N. (1983). Computers, Teaching, and Learning. Oregon: dilithium Press.

Appendix P

PROPOSED CURRICULUM FOR PROGRAMS LEADING TO TEACHER CERTIFICATION IN COMPUTER SCIENCE

A program of study leading to computer science teacher certification at the precollege level is proposed, with recommendations for required and elective courses.

TASK FORCE ON TEACHER CERTIFICATION IN COMPUTER SCIENCE

*This is a synopsis of a report jointly approved by the ACM Education Board and the IEEE Computer Society Educational Activities Board in July 1984. The complete report is available through the ACM Order Department.**

INTRODUCTION

Would a school system allow a person with only an eighth-grade education to become an English teacher? Would a self-taught math teacher be given full responsibility for the high school math program? The answers to these questions are obvious to everyone: To become a subject-matter specialist school teacher, one must study the subject in college, take special college courses in the teaching methods for the subject, and pass tests that earn teaching credentials in the subject.

Yet school systems, which have well-defined qualification standards for English and math teachers, today often assign full responsibility for the computer science program to teachers who are self-taught or whose formal training is equivalent to an eight-grade education in the subject. Although it is easy to understand the practical constraints that make these things necessary at the present time, it should also be easy to see that this unusual situation clashes sharply with the practice in all other subject areas. The issue of standards, qualifications, and training of computer teachers must be addressed.

In the Fall of 1983, a task force of the Association for Computing Machinery's (ACM) Elementary and Secondary School Subcommittee for Teacher Certification and Teacher Training was activated. The purpose of the task force's effort was to identify and recommend a program of study for teacher certification in computer science.

A major barrier to the widespread development of curricula for training classroom computer teachers is the lack of generally agreed-upon guidelines for the content of such programs of study. The purpose of this report is to propose, in concrete terms, a set of college-level courses that should be required of or be available to prospective precollege computer science teachers.

To appreciate its focus and accept some of its omissions, one should be aware of the task force's self-imposed constraints. First, the proposed curriculum only addresses preparation of teachers whose career goals include teaching computer science in a precollege educational setting. The issue of general teacher training for all teachers in the area of computer literacy is not addressed by the task force.

Second, since subject matter certification is generally required only at the secondary level, the proposed curriculum recommendations are aimed at secondary-level teachers.

Third, addressing each state's individual problems relative to certification standards is beyond the scope of these general recommendations. The curriculum represents common certification guidelines, with an understanding that different states and universities will be working under constraints that will require them to customize or modify the recommended curriculum.

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Fourth, because the downward migration of computer science courses from university to secondary and even junior high school levels is inevitable, it is assumed that the necessary training background for the teacher of these courses must be of great breadth and depth. In fact, the computer science teacher must be a computer professional.

The task force recognizes that the current precollege curriculum in computing is taught by dedicated teachers who have very little formal training in computer science. Although this trend will necessarily continue for some time, we must plan for the day when the certification of computer science teachers will be an accepted practice.

The task force's primary concern is computer science as an academic specialization. With this in mind, it is the members' intent to recommend a model curriculum which can guide both state departments of education and training institutions as they plan their programs for prospective computer science teachers. Certification requirements for this new discipline will necessarily vary from state to state. Our recommendations must be adapted to individual needs. Since 18 hours is generally the minimum number of semester hours required nationwide for certification in other academic disciplines, that number will serve as a base for our curriculum recommendations.

ARRIVING AT A PROPOSED CURRICULUM

The recommended curriculum for computing teacher certification is based on several earlier works. The computer competencies identified by a previous ACM task force [5] are, for the most part, included in the programs of study recommended here. In fact, by successfully completing the coursework identified in this report one should have attained the competency levels discussed in [5].

Another valuable source of information was provided by Taylor and Poirot's work [4]. Their study involved two major efforts. First, an extensive analysis of state requirements for computer science certification was undertaken. A survey was conducted to determine the status of certification in all 50 states [3]. Information about study programs at universities in those states offering certification was also obtained.

As a second effort, a survey instrument was sent to 40 selected leaders in the field of computer science education. Respondents to this survey were asked to express their opinions on the importance of teacher certification in computer science and to choose the computer science courses that should be included in a computer science education curriculum.

Another document of particular importance is *Curriculum '78* [1]. The computer science teacher whose primary responsibilities are the teaching of computer skills and concepts must not only be a competent instructor but must also be a professional computer scientist. The formal training of an individual charged with teaching computing topics must include a solid background in the academic discipline of computer science. In selecting computer science courses, the task force relied heavily on *Curriculum '78*, which has dramatically influenced computer science study programs at the university level. It provides a standard for curriculum development used by computer science departments across the country. Courses now common throughout the country are identified and defined in this publication. We have relied on the curriculum content of these courses in our analysis and formation of certification requirements.

Finally, *The 1983 IEEE Computer Society Model Program in Computer Science and Engineering* [2] is an important reference document. It also provides course guidelines for computer science departments.

THE PROPOSED CURRICULUM

The program of study recommended for certification in computer science consists of required and elective courses, where a course is three semester credit hours. Although the total number of courses required may vary from state to state, we feel the bare minimum should be six such courses. In addition, there should be as many electives as possible.

The required courses should include the following:

R1. Computer Science I
R2. Computer Science II
R3. Introduction to Computer Systems
R4. Organization of Computer Languages
R5. Data Structures and Algorithm Analysis
R6. Methods for Teaching Computer Science

One might argue that a computer science teacher should have even greater depth in computer science than is provided by these minimum requirements. However, practical considerations place limits on what can be accomplished by requirements in the near term; say for the next five years. In the future, as the situation changes, the question of requirements will need to be reexamined.

Courses that should be encouraged as elective courses in a teacher certification program should include the following:

E1. Computers in Education
E2. Computer-Assisted Instruction
E3. Introduction to File Processing
E4. Fundamentals of Computer Organization

R1, R2, R3, R4, R5, E3, and E4 are courses included in *Curriculum '78*. These courses are usually available in computer science departments. R6, E1, and E2 are courses uniquely designed for computer teachers interested in educational computing. These courses are not currently available in most universities, and may be implemented as either computer science or education courses.

COURSE DESCRIPTIONS

It is the task force's unanimous opinion that curriculum in a certification program should build on well-established and existent curriculum when possible. It is our understanding that computer curriculum and course descriptions will and should change as technology and

circumstances dictate. In fact, as of this writing, the recommended content of R1 and R2 is being revised by the ACM Education Board. We assume that such changes will continue but that the overall structure of the *Curriculum '78* courses will continue, and the courses will be readily available in computer science departments across the country.

The task force feels that computer science departments have undeniable service responsibilities to provide instruction to noncomputer science majors. *In particular, computer science departments should provide coursework for those preparing to teach computer science in school systems throughout the country.*

A brief list of objectives for each course that is identified in the certification program and is also included in *Curriculum '78* follows. Titles of the courses may vary somewhat from *Curriculum '78* but are easily identified. Further information on each cource may be found in [1].

R1. Computer Science I

a) to provide problem-solving methods and algorithm development;
b) to teach a widely used, high-level programming language;
c) to teach proper techniques of program design, documentation, and debugging.

R2. Computer Science II

a) to continue the development of programming discipline and design, especially for larger programs;
b) to introduce algorithmic analysis;
c) to introduce basic aspects of string processing, recursion, internal search/sort methods, and simple data structures.

R3. Introduction to Computer Systems

a) to provide basic concepts of computer systems;
b) to introduce computer architecture;
c) to teach an assembly language.

R4. Organization of Computer Languages

a) to develop an understanding of the organization of programming languages, especially the run-time behavior of programs;
b) to introduce the formal study of programming language specification and analysis;
c) to continue the development of problem solution and programming skills introduced in the elementary-level material.

R5. Data Structures and Algorithm Analysis

a) to apply analyis design techniques to nonnumeric algorithms which act on data structures;
b) to utilize algorithmic analysis in design criteria in the selection of methods for data manipulation in the environment of a database management system.

E3. Introduction to File Processing

a) to introduce concepts and techniques of structuring data on bulk storage devices;
b) to provide experience in the use of bulk storage devices;
c) to provide the foundation of applications of data structures and file processing techniques.

E4. Fundamentals of Computer Organization

a) to introduce the organization and structuring of the major hardware components of computers;
b) to understand the mechanics of information transfer and control within a digital computer system;
c) to provide the fundamentals of logic design.

Although these courses are typically found in computer science programs of study, three courses which should be available for certification programs are not included in *Curriculum '78* and are not available in most computer science departments. Whether or not service courses in educational computing should be taught in a computer science department or a college of education will depend on many factors peculiar to the institution. Thus, we do not address the issue of where the courses ought to be taught. Instead, we are concerned with the availability of course content for teachers preparing to teach computer science in a precollege setting. Since these courses are not defined in *Curriculum '78* or any other earlier official document, their more detailed descriptions follow.

R6. Methods of Teaching Computer Science

a) to provide prospective teachers with insights that will enable them to improve their students' computing skills;
b) to introduce teaching techniques for topics of computing, particularly programming;
c) to adapt computer science concepts for presentations in programming languages commonly available in an educational setting;
d) to examine the computing teacher's role in a secondary school setting.

The prerequisite for this course is *R5. Data Structures and Algorithm Analysis*. Because the prospective teacher will primarily teach programming, this course should reflect that focus. Although it will touch on many of the topics from the other required courses, the emphasis here will be complimentary rather than redundant, dealing with these topics and processes from the prospective of how they may best be learned, not what they are.

Throughout the course, strong emphasis should be placed on the learners' point of view, developmental level, and impact on how the abstract computing concepts are best presented. It also presupposes strong emphasis on the teacher's role in teaching computing, familiarity with appropriate research and learning, particularly learning computing and problem solving.

The need for continual teacher "updating" in computing technology should be emphasized. The importance of state-of-the-art knowledge should be stressed. Opportunities for continuing education, such as workshops, professional publications, and the like, should be discussed.

The following are the topics of study basic to the methods course (R6):

A. Methods of teaching students to view software and hardware as intermediaries in communication be-

tween human beings rather than as ends or sources of communication. Should help students learn to create software, including documentation, sensitive to the user's point of view, not just the programmer's. Requires experience using and maintaining software created by others.

B. Methods of teaching students to understand how to work effectively within the individual and social human environment. Should help students appreciate the intellectual limitations of humans as individual programmers and work effectively in software development teams. Requires familiarity with research on psychology of thought and social interactions.

C. Methods of teaching students to understand how hardware and software limitations constrain the development of every computer-based problem solution. Should help students understand how limitations such as those associated with memory, disk capacity and access speed, response entry device flexibility, and operating speed affect the degree of user support includable in current software. Requires students to experience different types of computers, representing different size and performance classes.

D. Methods of teaching students to see that good structure and modularity are essential in software systems, not only to arrive at an implementable design, but also to make any reasonable degree of maintenance or extensibility of that software possible. Requires students to work with systems too large to be implemented in a single module, to work in teams, and to maintain and modify software designed by others. Requires familiarity with research on how students learn to program and how structure affects design and maintenance.

E. Methods of teaching students to recognize the general aspects of programming across different languages, including how essentially similar logic must be implemented differently in alternative programming languages. Requires students to look at the formal structure (particularly control structures) of at least one, and preferably several, languages, in addition to the vehicle used in R1. Should include learning how to implement the best structure possible even in languages which, though popular, may not have effective and well-designed general control structures. Requires familiarity with research on programming style, learning problems, and other matters associated with programming structure.

E1. Computers in Education

a) to introduce the use of computers in education;
b) to analyze problems associated with educational computing, such as software and hardware evaluation, and administrative applications of computing;
c) to review and analyze computer applications software in an educational setting.

The prerequisites for such a course should include, at least, *R1. Computer Science I.* Students in this class should be concerned with the use of computing technology in the educational environment. The topics will be varied.

The following represents typical topics of study:

A. Introduction to computers in education. An overall survey of the varied uses of computers in education and a study of problems school districts and universities face relative to educational computing.

B. Software evaluation. A critical analysis of educational software in various academic disciplines and grade levels. The use of evaluative forms and the study of existing review criteria including observation of appropriate grade and subject matter users (e.g., kindergarteners using K-1 programs, etc.)

C. Hardware evaluation. Analysis and evaluation of hardware alternatives, peripheral devices, networking, and hardware expansion in an educational setting. Microcomputer system design.

D. Administrative applications. The use of the computer for administrative applications such as attendance, scheduling, etc.

E. Programming and software packages in an educational environment. The use of software packages for instructional design and delivery. The use of application packages such as word processing, spread sheets, and database systems.

F. Future educational implications. Planning for computer educational usage. Trends in technology. Topics in educational computing with emphasis towards the future.

E2. Computer-Assisted Instruction

a) to critically review and evaluate educational software;
b) to introduce techniques for developing educational software;
c) to study and utilize authoring packages for educational software;
d) to consider the power of expert systems and other knowledge-engineered instructional materials.

The prerequisites for this course should be *R1. Computer Science I* and *E1. Computers in Education*, at least. Students in this class should be concerned about the evaluation and development of high-quality educational software. The following represents typical topics of study:

A. Introduction to modes of CAI, definitions of these modes, and demonstration of the various types of CAI. Description of CAI algorithms such as answer processing routines, trials, etc.

B. Discussion of components of CAI, questioning episodes, formal answer processing, types of responses, types of trials. Description of authoring languages.

C. Discussion of the components of a drill and practice. Analysis of the CAI algorithms which comprise drill and practice.

D. Discussion of the types of simulation and their implementation. Analysis of the design of simulations and how they can be implemented.

E. Discussion of the components of testing. Analysis of

the design of a test generation system. Implementation of a testing system using an authoring language.

F. Graphics implementation on microcomputers and its use in CAI.

PROGRAMMING LANGUAGES

Several of the courses recommended emphasize programming languages. The specific language taught in R1, for example, is not of great concern; however, the language tools required by teachers at the precollege level are fairly well recognized. Such recognition comes not only from the existing languages utilized throughout precollege instruction but from the major impact microcomputers and their languages have had in this environment. We feel that for the immediate future teachers certified in computing should be proficient in at least three computer languages: BASIC, Pascal, and LOGO.

The controversy surrounding the use of BASIC as a programming language continues. Future generations of programming languages may very well not include BASIC, but the fact remains that it is currently the most widely used microcomputer programming language. Since school districts are overwhelmingly utilizing such systems, teachers should be familiar with BASIC and its usage in an educational setting. BASIC might be introduced in *R1. Computer Science I*, *R4. Organization of Programming Languages*, and/or *R6. Methods of Teaching Computer Science*. In whichever course BASIC is taught, it is essential that prospective teachers learn more than just the vocabulary and grammar of the language. In particular, they should master the technique of top-down, modular BASIC. They should also learn to handle all problems in program logic by means of the disciplined use of formal control structures for loops and branches. They should learn how to build these control structures from the common BASIC control statements, IF and GOTO. Only with such training can a teacher, who often has no choice but to teach programming in BASIC, succeed in teaching the higher-order, problem-solving goals of learning programming, whatever the language. Without such teacher training, many schools will continue to be guilty of turning out BASIC programmers who, in the words of an eminent computer scientist, "are mentally mutilated beyond the hope of regeneration."

Pascal is a programming necessity today for those seeking certification. Pascal has now become one of the major languages utilized throughout university computer science curriculum. Most likely, the upper-level required courses in the certification program could not be successfully completed without Pascal as a tool. Many secondary schools across the country are now introducing Pascal as a programming language and several are preparing students for advanced placement in the university setting. Pascal might be introduced in *R1. Computer Science I*, and would most likely be integral to *R2. Computer Science II*, where structured programming is emphasized.

LOGO is a language of particular importance to the precollege teacher. It is widely used as a programming language and as an instructional tool. Thus, LOGO should be introduced and analyzed for teachers in a certification program. The most likely place to introduce LOGO is in *R6. Methods of Teaching Computer Science*.

SUMMARY

A new subject, computer science, is becoming an established part of precollege education. There are currently tens of thousands of *de facto* computer teachers in our schools today. Except for a handful, these teachers are untrained in the very subject they teach. Although the present situation is understandable and even tolerable as a way of getting the new subject under way, there are grave dangers in allowing it to continue.

The traditional solution to this problem is to establish certification standards for teachers and to create a formal curriculum aimed at preparing subject-matter specialists who can meet the standards. The purpose of this report is to propose and recommend guidelines for the curriculum intended to prepare precollege computer science teachers.

The guideline curriculum recommended by the task force for meeting teacher certification requirements is a combination of existing courses available in the standard college computer science curriculum and new service courses unique to the training of computer teachers. In selecting the computer science courses, the task force used previous curriculum reports as a guide.

The recommended curriculum is a guideline. Not all institutions will find an exact match between the courses described here and those available to their students. Nevertheless, the task force urges that the essential content of the courses described in this report should be used as a base for training precollege computer teachers.

REFERENCES

1. Austing, R.H., et al. (Eds.). Curriculum '78 recommendations for the undergraduate program in computer science. *Commun. ACM* 22, 3 (Mar. 1979), 147–166.
2. IEEE Computer Society. *The 1983 IEEE Computer Society Model Program in Computer Science and Engineering*, Jan. 1984.
3. Taylor, H., and Poirot, J.L. Survey shows state certification of computer science teachers progressing slowly. *Electron. Learn.* 2, 7 (Apr. 1983), 16–18.
4. Taylor, H.G., and Poirot, J.L. The certification of high school computer science teachers. In C.D. Martin and R.S. Hellen (Eds.), *Capitol-izing on Computers in Education, Proceedings of the 1984 Association for Educational Data Systems Annual Convention*, Rockville, Md. Computer Science Press, 1984.
5. Taylor, R., Poirot, J.L. and Powell, J.D. Computing competencies for school teachers. In *ES3 Report*, A Preliminary Report of the ACM's Elementary and Secondary Schools Subcommittee, Feb. 1980, 42–54.

CR Categories and Subject Descriptors: K.3.0 [**Computers and Education**]; K.3.2 [**Computers and Education**]: Computer and Information Science Education; K.3.m [**Computers and Education**]: Miscellaneous

Additional Key Words and Phrases: computer science teacher certification, teacher certification, teacher training, teacher education, computer courses, computer curriculum.

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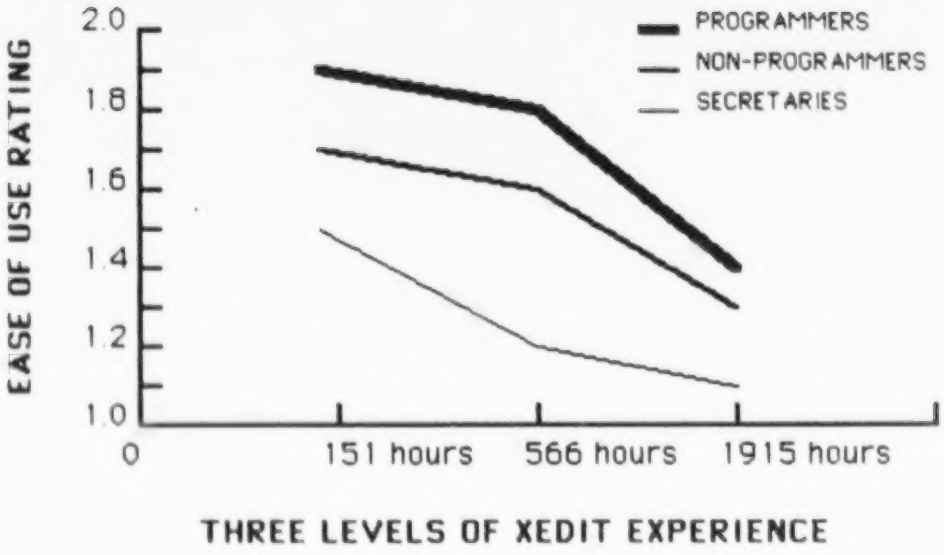
Appendix Q



Ease of use ratings as a function of XEDIT experience and work type. On the rating scale, a 4 corresponded to "very difficult", a 3 to "fairly difficult", a 2 to "fairly easy" and a 1 to "very easy."

Taken from a figure and data reported by Rosson (1984).

Rosson, M. B. (1984). Effects of experience on learning, using and evaluating a text editor. Human Factors, 26, 463-475.

Appendix R

UNIVERSITY OF MAINE *Presque Isle*

Presque Isle, Maine
207 764-0311

To: Dr. Richard Kimball

Fr: Dr. A. R. J. Yeaman

Re: Bond Issue Computer Plans

Dt: March 8, 1985

COMPUTER INTERACTIVE VIDEO

Instruction through computer-based interactive video increases learning efficiency by combining the capability of the microcomputer with the graphic quality of video. The microcomputer presents a video lesson and then tests with questions. The student answers on the computer keyboard and is allowed to go to new material only when answers are correct. The computer organizes and files all student responses for review by instructors.

The corporate environment has been particularly enthusiastic about computer interactive video since workers increasingly need in our information society frequent retraining. Computer interactive video learning stations in the workplace allow unique flexibility in scheduling, instruction adjusted to each student's level and pace of learning and the color picture and sound of television.

Since it requires learners to be active and interact with the educational program, instruction is thought to be particularly effective. Therefore, it has already been adopted in forward-looking elementary and secondary schools.

Computer-based video has undergone rapid and wide acceptance in the last two or three years in not only national corporations but also the Department of Defense. There it has been applied with success in classrooms of large groups.

There are, however, relatively few people qualified to design and produce computer interactive video. Students from the University's Educational Computing program can fill this need. The opportunity for students to learn about systematic instructional design should be combined with hands-on experience in authoring computer interactive video. Their class projects would require working on developing instructional packages for faculty and local businesses.

Graduates of the Educational Computing program should be able to carry their computer interactive video skills with them into the public schools or into business and industry. Their knowledge in this emerging area will vastly increase the quality and number of their employment opportunities.

Augmenting the Bachelor of Science in Educational Computing degree program with computer interactive video will accomplish these things:

- Maintain the University's distinction of being a leader with its unique Educational Computing degree.
- Improve the quality of the graduates from the Educational Computing program.
- Relate the Educational Computing program more to the training needs of business and industry.
- Provide and avenue for the Educational Computing program to develop, grow and acquire another faculty member.
- Support the improvement of instruction at the University.
- Relate the Educational Computing program to the fulfillment of community needs.
- Open possiblities for new ways of reaching our University students--including, for instance, teaching how to use a micro-computer for word processing.

Basic needs to get started:

- Apple or IBM microcomputer
- Industrial quality videocassette recorder
- Computer interactive video authoring software
- Computer interactive video interface & controller
- Combination monitor displaying both video and and computer signals
- Hardware and software supplies for small-format interactive video production
- Minor remodeling to provide an adequate facility

To: Dr. Richard Kimball
From: Dr. Andrew R. J. Yeaman Andrew R.J. Yeaman
Subj: Future Computing Developments on Campus
Date: December 19, 1984

Database managers, electronic spreadsheets and word processing are the three types of software packages which we agree are the new intellectual tools that are promising to become widespread. Many students, faculty and staff could benefit if they had access to them in a "computing lab". Software distribution would be made easier by networking stand-alone micro-computers together to a hard disk system in the lab.

Other needs to be met for these people are access to on-line services: the University's mainframe computers, the libraries, information utilities and encyclopedic databases. Privacy is important to people studying, also.

A parallel facility for Educational Computing would not emulate the language learning lab but be a secure place for authorized students to work with a collection of unique hardware and software. A computer interactive video production facility may be adjacent as may the head end of a videotex distribution network.

While it is reasonable to expect a rapid increase in the number of computers occupying personal work areas, the justification for linking them all together is not here yet. It is likely that people will adopt new communication technology which helps them do better what they are doing at present. They are unlikely to do totally new things which are irrelevant to their current goals. Access to the information tools identified in my first two paragraphs are acceptable within this paradigm but electronic mail across campus is dubious.

I would be happy to discuss these issues further.

cc: Dr. Richard Cohen
Dr. Jack C. Sheltmire

Appendix S

The present direction of the Educational Computing program suggests acquisitions in these categories would be advantageous:

- demonstration educational software
- education application software
- a variety of instructional authoring software
- a larger variety of microcomputer hardware
- personal robots for robotic studies
- continual updating of the library collection of educational computing books and periodicals
- computer based interactive video production and playback equipment including a selection of demonstration laser video disk programs
- graphic design and production software
- video digitization software and hardware
- high quality printer such as a laser printer
- futuristic but affordable interface hardware and software for speech interaction, direct manipulation, etc.
- online services: information utilities and bibliographic data bases